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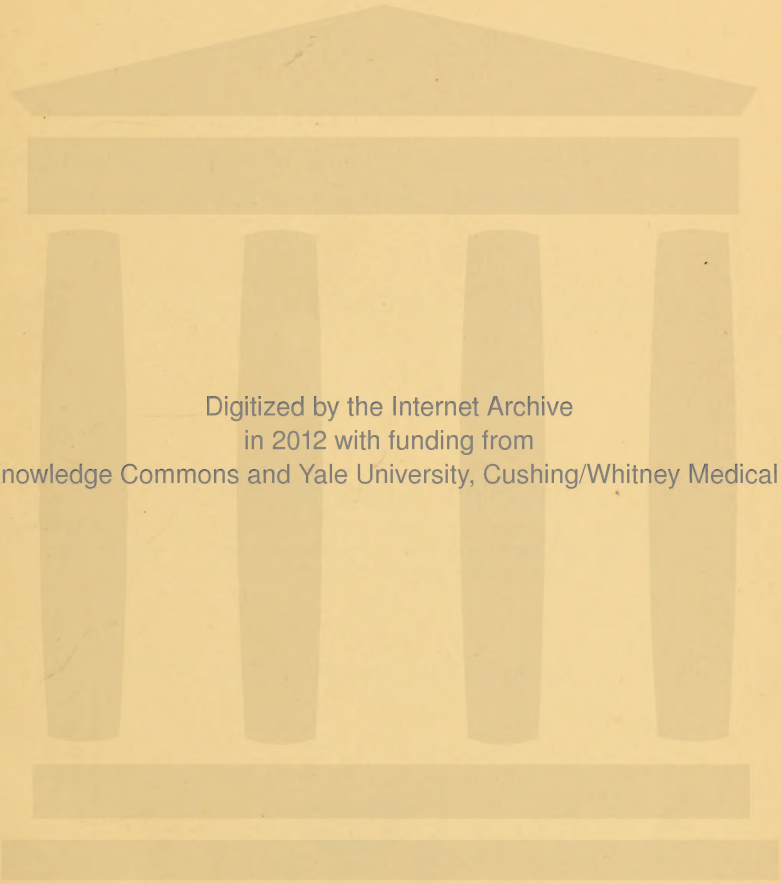

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THE

THROAT AND NOSE,

AND THEIR DISEASES.

WITH ONE HUNDRED AND TWENTY ILLUSTRATIONS IN COLOR,
AND TWO HUNDRED AND THIRTY-FIVE ENGRAVINGS,

DESIGNED AND EXECUTED BY THE AUTHOR.

BY

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THIS WORK IS DEDICATED

TO THE

COMMITTEE AND MEDICAL STAFF

OF THE

CENTRAL LONDON THROAT AND EAR HOSPITAL,

IN GRATEFUL RECOGNITION OF GENEROUS SUPPORT

AND CORDIAL CO-OPERATION IN ATTAINMENT OF THE EXPERIENCE

ON WHICH ITS TEACHINGS ARE BASED.

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PREFACE TO THE THIRD EDITION.

THE rapid sale of the second edition of this work may be accepted as sufficient evidence that it satisfactorily meets a demand; and the fact that the reviewer of a leading medical journal has pronounced it to be 'one of the completest treatises on diseases of the throat in any language,' might be pleaded as an excuse for a simple re-issue.

At the time, however, of the appearance of this flattering notice the book was already out of print, and I had far advanced in that thorough revision and extension which had been rendered necessary, not only because I recognised the justice of many kindly but pertinent criticisms, but also because the science of Laryngology and Rhinology is making such giant strides, that it is impossible for one who wishes to keep his work up to date to be content with what was written even so recently as two years ago.

Especial note has been taken of the circumstance that Laryngology, which formerly depended almost entirely upon the somewhat limited revelations of the laryngeal mirror, is in these later times assuming a new aspect, and opinion is each day becoming more indisputable that in the condition of the Nasal Fossæ, which constitute the first avenues of the natural breathway, is to be found the key to a right understanding and successful treatment of the majority of Faucial, Pharyngeal, and Laryngeal diseases. The chief feature of this edition is, therefore, fitly emphasized by the expansion of that portion of the volume which treats of intra-nasal and naso-pharyngeal maladies. In this connection several new illustrations of the various forms of nasal obstruction, and of instruments for their relief, are added.

In deference to this growing recognition of the important influence which diseases of the Nose exercise upon those of the Throat and Larynx, I have somewhat amplified my title; but the arrangement of the work remains the same as in previous editions.

The functions of the Tonsils have long been a subject of speculation, and the general ignorance of their utility was well exemplified by the somewhat startling announcement made a few years since by an eminent physician recently deceased, that were he to play the part of a Frankenstein, he would make man without them. Possibly it was this remark that drew the attention of some of the more enthusiastic and younger members of the profession to the subject, as an unexplored field for their labours; but certain it is that within recent years much valuable work has been done, which has proved that these glands play important *rôles*, the chief of which is probably that of the manufacturing of leucocytes, to act as 'scavengers' for the clearing away of food *débris*, and for the holding in check micro-organisms in the upper respiratory and alimentary tract. It has also been shown that these lymphoid structures are not confined to the fauces or to the naso-pharynx, but that similar though smaller aggregations of adenoid tissue are to be found at the root of the tongue, in the ventricle of the larynx, in the nose, and other situations, constituting minor 'tonsils'—lingual, laryngeal, etc.—with similar duties to those of their more important congeners of ordinary recognition. The subject has been expanded in this edition commensurately with its importance.

I deem it a pleasurable duty to once more acknowledge the kindness of those colleagues and friends who assisted me in the preparation of the last edition, for similar help in that of the present.

36, Weymouth Street,
Portland Place, W.
May, 1890.

PREFACE TO THE SECOND EDITION.

THE first edition of this work was published in May, 1878, just nine years ago, and was so well received as to be exhausted in less than eighteen months. My intention was to comply at once with the demands for a further issue, but many causes have prevented its accomplishment. Chief among them is the fact that the literature of the subject, in the shape of manuals, monographs, and more especially periodical contributions, has increased in such a full and constant flow as to convince me, on each fresh attempt at revision, that nothing less than an entire re-writing of the book would suffice to do justice to the growing importance of the theme. The calls of practice and literary claims in other directions have combined to impede the completion of this project.

Now that the task is finished, no one is more sensible of its imperfections than myself. I nevertheless venture to express the hope that my readers will be the gainers by the delay.

Claiming an experience of twenty years of uninterrupted and exceptional clinical opportunities, I have in this volume endeavoured to tell unreservedly everything I have learned, both in Consulting-room and Hospital-ward, which is likely to be helpful in the diagnosis and treatment of that class of diseases with which my professional life has been almost exclusively occupied.

The work has no pretensions to be considered exhaustive. It will have fulfilled its aim if it is accepted as containing so much information on the subject as may be required for all needs of the general practitioner, and as, at least, a solid basis for more extended research to those who may elect to practise as specialists.

Some of the changes and additions made in this new volume are indicated in the introductory remarks following this preface: to detail all would be tedious and unnecessary. It is sufficient to say that my endeavour to give an accurate reflection of the vast

progress of the specialty since the former edition was published has involved extension of the letterpress to something like treble the length of the earlier work. The engravings have been quadrupled, and twenty new coloured illustrations have been added. Attention may also be drawn to the much fuller consideration given to diseases of the Nasal passages, as well as to the suggestions concerning such Aural affections as are more especially connected with morbid conditions of the Throat.

The practical character of the treatise necessarily makes it somewhat personal in its tone, but there is neither thought nor wish to appropriate all that is taught as original. On the contrary, short of encyclopædic reiteration of references, credit is always duly accorded to other labourers in the same vineyard.

The many obligations I am under to my Hospital colleagues for their interest and assistance in my labours are acknowledged, though inadequately, in the dedication and in the body of the book; but I cannot refrain from more particular mention of Dr. Dundas Grant and Mr. William Hill.

The former, since he joined us as Registrar in 1878, and later as one of the Surgeons, has never failed in his enthusiasm to prosecute any fresh inquiry suggested to, or emanating from him, and has been always an original and sympathetic fellow-worker.

Mr. Hill, our present Registrar and Pathologist, has rendered me much willing and valuable aid in histological investigations, in compilation from contemporary literature, and in revision of the proofs generally.

It is a pleasure also to acknowledge the great assistance rendered me in the relation of cases, by the zeal and efficiency with which former Surgical Registrars—Messrs. J. D. Arnold (now of St. Francisco), Carmalt Jones, Percy Jakins, and W. Cant—have performed their duties.

36, Weymouth Street,
Portland Place, W.
June, 1887.

DISEASES

OF THE

THROAT AND NOSE.

INTRODUCTORY.

A FEW words with regard to the aims and plan of this work may be useful to the reader.

Necessity no longer exists for enforcing the value of the laryngoscope. By its means, not only are many special local maladies, otherwise invisible during life, brought directly under the eye of the observer, but in many serious general diseases, such as phthisis, cancer, and syphilis, as well as in cases of aneurismal or glandular tumours, the local condition of the larynx thus revealed will at a very early period enable us to form a diagnosis and prognosis, which without such knowledge would be often erroneous, or at least doubtful.

[1]Ziemssen* has proposed, and [2]Elsberg has also insisted, that courses on laryngoscopy and laryngological technics, as well as other methods of diagnostic and therapeutical procedures, should *precede* attendance on general clinical instruction, the argument being based on correct appreciation of the fact that unless the student is already in possession of the technical ability required, the mere looking on the performances, or listening to the words, of the best clinical teacher is comparatively valueless for his own doings in practice. Until some change in this direction is effected, practical skill in technical specialties, such as laryngology, ophthalmology, and otology must be confined to the minority of students conscientiously desirous to equip themselves at all points for their

* The small numerals attached to the names of authorities refer to the Bibliographical List at the end of each chapter.

life-long battle with disease, and to the still smaller number of the many, who, made conscious of their deficiencies only after their entrance into practice, have the opportunity, by post-graduate courses, of acquiring that information and facility unattained—possibly unattainable—in their days of studentship.

In the hope of supplying this want—so far, at least, as written pages can substitute personal instruction—this book has been written.

Clinical study, as the name implies, can only be efficiently pursued in the presence of the patient ; but I have endeavoured to frame a work which, in its bearings, is intended to be essentially clinical. It is, however, hardly necessary to give the warning that rules for general instruction cannot always be applied without modification to individual cases.

Attention is mainly directed to the diagnosis and treatment of those diseases of the throat which have been brought more prominently into view since the introduction of the laryngoscope.

But the strong reflected light necessary for laryngoscopy has aided in more accurate observation of diseases of the fauces and pharynx ; and the rhinoscope, a corollary of the laryngeal mirror, has been of similar service in reference to disorders of the naso-pharyngeal and nasal passages. Equal consideration is therefore given to the various morbid conditions of these regions.

Those affections which may be considered peculiar to the throat and nose are fully discussed, both with reference to their local symptoms and their effect on the general health. In the case, however, of those diseases, such as diphtheria, syphilis, and phthisis—which, although manifesting grave symptoms in the throat and requiring special local treatment, are in point of fact primarily the result of a general poison—attention is given principally to the diagnosis and treatment of the local malady.

The chapters on deafness in relation to affections of the throat and nose, introduced in the second edition, are retained ; and albeit no further amplified in this later one, I venture to deprecate the criticism that because of their brevity they might be omitted ; for although perhaps they comprise not much more than an enumeration of the aural maladies dependent on morbid conditions of the throat and nose, with but general indications for treatment, the whole book emphasizes the close association of these regions, and consequently the importance of a thorough aural examination, in all cases which may be presented to the specialist.

With the intention of avoiding unnecessary repetition, the earlier chapters are written with such method and detail as to

make them a key to the rest of the work. In order, then, that the later portions may be well understood, it is essential that the preliminary chapters be carefully studied, and their lessons thoroughly mastered with the aid of frequent examinations of the healthy throat and larynx: diligence and perseverance being as necessary for this purpose as they are for a perfect knowledge of healthy chest-sounds as revealed by the stethoscope, or of the normal fundus of the eye by the ophthalmoscope. The student may further perfect himself by adopting one of the methods of auto-laryngoscopy.

In this edition the section on Regional Anatomy and Physiology, which is much fuller than in the former, is placed first. This position does not interfere with the continuity of the work, and the contents may be perused or 'skipped,' according to the inclination or state of knowledge of the reader.

The chapters on Semeiology and General Therapeutics are also given very fully; and unless these be attentively considered, the importance of the references to differential symptomatology and treatment of the various diseases, later considered under their separate headings cannot be appreciated.

From a desire not to unnecessarily increase the bulk of the work, or to destroy its practical character, I omitted in the first edition 'questions of purely pathological interest.' I admit the justice of the criticism from more than one source, that my reticence in this respect was carried to excess, and that the book would have been made more valuable, and no less practical, by the insertion of more complete pathological data. This want I have now endeavoured to supply; first, by a new chapter on the General Etiology and Pathology of the subject, and also by direct consideration of the morbid anatomy, as observed during life, of each disease when separately treated. With a few exceptions—those of laryngeal phthisis, cancer, and diphtheria—I have felt constrained, for the reasons originally given in the Preface to the first edition, to adhere to my decision not to include illustrations or descriptions of post-mortem appearances.

In the separate discussion of each form of disease the arrangement of signs, symptoms, and methods of treatment adopted in these general chapters is as far as possible followed. I am aware that such a plan is open to certain objections, and may sometimes cramp the flow of description; but the advantages for reference and comparison of a uniform method to the busy practitioner have appeared to me to offer ample compensation.

Histories of cases in detail were for the most part excluded

in the earlier edition. This rule is now somewhat modified, and without intention to make the volume a mere transcript of my note-book, short accounts of cases are given wherever their narration is thought likely to elucidate points of pathology, diagnosis, or practice. In addition, all the drawings of diseased appearances, whether in the text or in the coloured plates, are accompanied by explanatory notes bearing on the nature of the cases illustrated.

Pictorial illustrations of disease as seen with the laryngoscope and rhinoscope are believed to be essential to any work intended as a practical guide. The illustrations of the present volume have all been taken from nature. The engravings represent my own drawings on the wood, or are fac-simile reproductions. The lithographs also were placed on the stone by myself. In the first coloured plate of the normal laryngeal image every variety and form of healthy larynx is figured; but afterwards, in plates illustrative of disease, only those points which are departures from the normal are indicated, and a type is taken all through of the most usual forms of larynx—that seen in Figs. 1 and 2 of Plate I. Intended to represent *types* of disease, the drawings have in a few instances been somewhat conventionalized—that is to say, accidental differences of portraiture have, for the sake of simplicity, been omitted. Plates I. and X., which in the first edition were rendered as photographs in autotype of my original drawings, are now represented by lithographs in monochrome. Four other coloured plates further elucidating the laryngoscopic and morbid appearances of Tuberculosis, Syphilis, Lupus, Cancer, and Diphtheria have been added.

The lithographic illustrations are arranged with especial regard to more convenient reference than is usually possible. Each plate can be opened out so as to lie beside the book during perusal of the text descriptive of the disease pictorially illustrated.

Wood engravings, most of which are original, have been inserted where necessary. Their number in this edition is more than treble that in the former; and this increase is largely due to the fact that I have been able to include a very complete series of original illustrations of the anatomy of the larynx from *Voice, Song, and Speech*. For permission to do this I am indebted to my esteemed friend and co-author of that work, Mr. Emil Behnke, and also to the publishers, Messrs. Sampson Low, Marston, and Co. I have likewise added several new figures illustrating the anatomy of the pharynx, nares, and soft palate, numerous original drawings of laryngoscopic portraits of disease, and some interesting views of the larynx and soft palate in tone-production—these last also from *Voice, Song, and Speech*.

As to the instruments, except occasionally for purposes of comparison, only those found of value in my own practice are figured. They are generally drawn to scale, so as to be available as working drawings. The majority of the instruments illustrated and described have been made for me according to my patterns by Messrs. Krohne and Sesemann, of Duke Street, Manchester Square; but I am also much indebted to Messrs. Coxeter and to Messrs. Mayer and Meltzer for carrying out and perfecting several of my crude suggestions as to new instruments and improvements. Without the mechanical and practical skill of such firms, the so-called inventions of many of us would prove but of slight utility when tested in the consulting-room or operating theatre.

As mentioned in the preface, care has been exercised to give the names of all to whom credit is accorded for originality as well as of those from whom I may differ on points of theory and practice, and any omission in either of these directions is accidental. With a view, however, of ensuring greater comfort of perusal, the luxury of foot-notes or intercalated references is altogether dispensed with, and their space supplied by a bibliographical list of references at the end of each chapter.

It will be observed that I quote very largely from the writings of my American confrères in the specialty. No excuse is needed for this procedure, because from no quarter have we derived, in these later days, so many original observations and suggestions of real practical value as from the members of the American Laryngological Association.

One word more—to avoid reiteration, it is to be noted that allusion to 'colleagues' refers always to my co-workers on the surgical staff of the Central London Throat and Ear Hospital, who, in addition to a willingness at all times to give me assistance in my own work, have with rare liberality and unanimity always drawn my attention to any cases of unusual interest occurring in their own practice.

Lastly, a full list of formulæ of remedies is appended, reference being made to it in the text by numerals corresponding to those affixed to the formulæ.

REFERENCES TO AUTHORITIES.

PAGE.	NO.	NAME.	TITLE OF WORK REFERRED TO.
1	1	Von Ziemssen.	*Deutsches Archiv für Klinische Med.*, vol. xiii., 1874.
1	2	Elsberg.	*Archives of Laryngology*, New York, vol. i., p. 364.

CHAPTER I.

ANATOMY AND PHYSIOLOGY OF THE THROAT AND NOSE.

ALTHOUGH it is beyond the scope of this work, written as it is for advanced students and practitioners of medicine, to discuss in detail the anatomy and physiology of the larynx, some brief account of its structure and uses is essential to a right comprehension of the laryngoscopic image, as well as of the changes made by disease both in tissue and function, as viewed with the laryngeal mirror. For the same reason, it will be necessary to review the more salient features of the anatomy and functions of the pharynx, soft palate, nostrils, etc.

The **Larynx** may be described as a box composed of cartilages which are connected by ligaments and membranes, and acted upon by various muscles. Commencing at the base of the tongue, it extends downwards as far as the trachea, constituting the first portion of the respiratory tract, and containing the organ of voice.

Anteriorly it is almost subcutaneous, and forms the well-known prominence called Adam's apple, or Pomum Adami (Fig. I., 1); on each side of it lie the great vessels of the neck, and its posterior wall forms the anterior boundary of the pharynx. In shape this voice-box is irregularly triangular, the apex being in front, the base behind. It is open below and above. Below it is continuous with the trachea (Fig. I., 14), and above it opens into the pharynx, its aperture in this direction being closed by a kind of movable lid—the epiglottis (Fig. I., 13).

The skeleton of the larynx is constructed of nine separate parts, viz., four cartilages, the thyroid (Fig. I., 7), cricoid (Fig. I., 2), and two arytenoid, (Fig. III., 1 and 2); one principal fibro-cartilage, the epiglottis (Fig. I., 13); and four smaller fibro-cartilages, those of Wrisberg (Fig. V., 11 and 12) and of Santorini (Fig. V., 9 and 10), two of each. These latter are of little practical importance, being, as it were, merely supplementary to the arytenoids.

[1]Luschka further describes as occasionally present one inter-arytenoid cartilage; and as more frequently existing, two pairs of small cartilages, the sesamoideæ anteriores and posteriores (Fig. XI., 11 and 12). The four first-named cartilages are liable to ossification as the result of age or disease, but the epiglottis and other fibro-cartilages never undergo this process. The various cartilages, large and small, are connected by ligaments, and by a variety of articulations are capable of many movements.

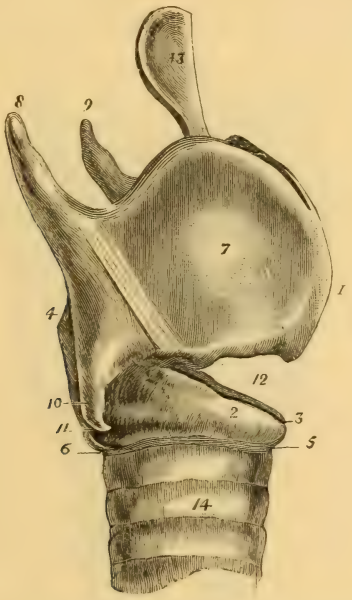

FIG. I.—SIDE VIEW OF THE LARYNX.

1. Prominence of thyroid cartilage (Pomum Adami).
2. Cricoid cartilage.
3, 4. Upper border of cricoid.
5, 6. Lower border of cricoid.
7. Thyroid cartilage.
8, 9. Superior cornua of thyroid.
10. Right inferior cornua of thyroid.
11. Articulation of the thyroid with the cricoid.
12. Crico-thyroid aperture.
13. Epiglottis. 14. Trachea.

The **Thyroid cartilage** (*θυρεος*, a shield) is the largest of the laryngeal cartilages (Fig. I., 7, and Fig. II., 12 and 13), and is well named the shield of the voice-box, containing and protecting as it does, the essential parts of the vocal organ—the vocal cords. Latterly [2]C. Ludwig has called it the 'Stretching' cartilage, because the tension of the vocal cords is dependent on the lever-like movements of the thyroid cartilage. It is composed of two alæ or wings, united anteriorly at a sharp angle by a centre-piece, the lamina mediana cartilaginis thyroideæ (Fig. I., 1), which is found at every age and in both sexes. The vocal cords

(Fig. III., 6, 3, 3), as well as the thyro-arytenoidei interni muscles, are attached to this median lamina. The wings of the thyroid (Fig. II., 12, 13), expanding outwards and backwards, form the two lateral walls of the larynx. Their superior horns or cornua (Fig. II., 1, 2), are connected with the hyoid bone (Fig. II., 5) by the thyro-hyoid ligaments; and the thyro-hyoid membrane extending between the cornua and the hyoid bone serves to still more closely connect these two structures. The epiglottis (Fig. II., 10, 11) is attached to the interior of its superior margin by the thyro-epiglottic ligament, while inferiorly the thyroid and cricoid carti-

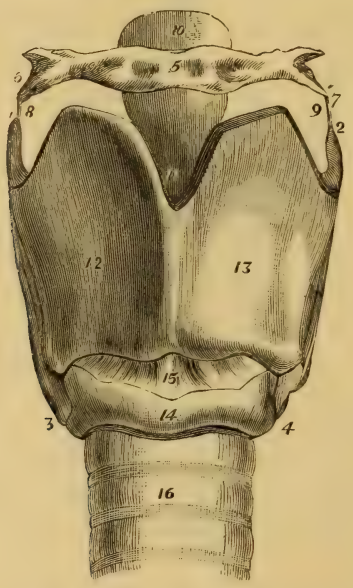

FIG. II—FRONT VIEW OF LARYNX.

1, 2. Superior cornua of thyroid.
3, 4. Inferior cornua of thyroid.
5. Hyoid bone.
6, 7. Cornua of hyoid bone.
8, 9. Thyro-hyoid ligaments.
10, 11. Epiglottis.
12, 13. Alæ of thyroid cartilage.
14. Cricoid cartilage.
15. Crico-thyroid membrane.
16. Trachea.

lages are connected by that most important surgical structure, the cricoid-thyroid membrane (Fig. II., 15). Two inferior cornua of the thyroid are further united to the cricoid by capsular ligaments lined with synovial membrane (Fig. II., 3, 4); while to the arytenoids the thyroid is united by the vocal cords, and by the thyro arytenoid muscles (Fig. IV., 1, 2, 3, 4).

The **Cricoid cartilage** (Fig. III., 10) receives its name from its ring-like form (κρικος, a ring). C. Ludwig calls it the 'Foundation' cartilage, because upon it is built, as it were, the whole framework of the larynx. As we have seen, the thyroid rests

upon it by its inferior cornua (Fig. II., 3, 4), and on it rotate the arytenoid cartilages (Fig. III., 1, 2). It may also be considered as the capital of the column of the trachea, with which it is connected by fibrous tissue (Fig. I., 5, 6). It is narrow, in a vertical direction anteriorly, but broad and deep behind. Continuing the comparison to a signet ring, the part corresponding to the seal is thus seen to be placed posteriorly. The lower rim of the cartilage (Fig. I., 5, 6) is nearly horizontal in position, but its upper margin (Fig. I., 3, 4), from the greater depth of the posterior part inclines from before upwards and backwards. The posterior part of the

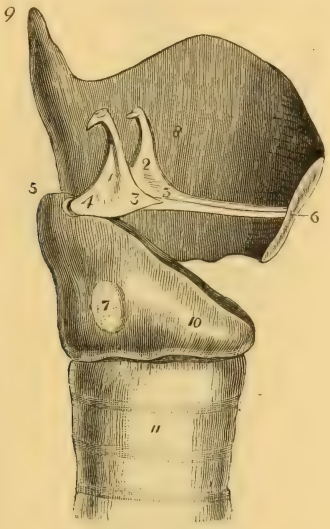

FIG. III.—SIDE VIEW OF LARYNX, SHOWING THE INTERIOR, THE RIGHT PLATE OF THE THYROID BEING REMOVED.

1, 2. Arytenoid cartilages.
3, 3. Processi vocales of the arytenoids.
4. Processus musculus of the right arytenoid.
5. Upper border of cricoid.
6, 3, 3. Vocal cords.
7. Facet for articulation of the thyroid with the cricoid.
8. Left plate of the thyroid.
9. Left superior cornu of thyroid.
10. Cricoid cartilage.
11. Trachea.

cricoid, the *lamina cartilaginis cricoidæ*, is hexagonal in shape, neither the sides nor the angles, however, being exactly similar, although the two halves are symmetrical. In the median line behind and internally is an elevated ridge which separates two slight depressions for the insertion of the posterior crico-arytenoid muscles, while in front there is a notch, the space between this part of the cartilage and the thyroid being filled in, as already stated, by the crico-thyroid membrane (Fig. II., 15). On its posterior and superior aspects it presents two broad saddle-shaped articular facets for the reception of the bases of the arytenoid

cartilages. Further, the cricoid cartilage marks the level of the commencement of the œsophagus, and is surgically interesting from the fact that its posterior surface offers the only point of resistance in the anterior part of the gullet, and is (probably on this account) a favourite seat of malignant ulceration.

The **Arytenoid cartilages** (Fig. III., 1 and 2), two in number, are pyramidal in shape, their apices pointing upwards and inwards, and when joined together they bear a fanciful resemblance to a pitcher (*αρυταινα*). Situated at the back of the larynx, they articulate by their bases, which are concave from before backwards, with the articular facets already described, on the upper and

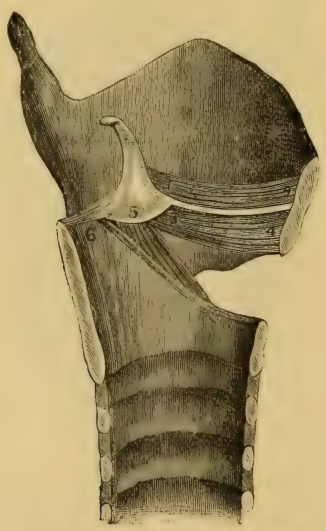

FIG. IV.—SIDE VIEW OF THE LARYNX, SHOWING THE INTERIOR OF THE LEFT HALF.

1, 2, 3, 4. Left vocal cord and the thyro-arytenoideus muscle.
5. Left arytenoid cartilage.
6, 7. Cricoid cartilage.
5, 7. Crico arytenoideus lateralis muscle.

posterior part of the cricoid (Fig. III., 4). Ludwig calls the arytenoids the 'Regulating' cartilages (*Stellknorpel*), because on their position depends the shape of the chink of the glottis. The base of the arytenoid, by means of which it articulates with the cricoid, is prolonged into two distinct processes. One, the posterior (Fig. III., 4), has the shape of a hook, and not only gives attachment to the crico-arytenoid muscles (both posticus and lateralis), acting as a lever, but it also answers the purpose of securing the position of the arytenoid on the cricoid cartilage. Luschka calls it accordingly the *processus musculo-articularis*. The anterior part of the bases of the arytenoids—the *processus vocalis*

(Fig. III., 3, 3)—is a projection the point of which may be perceived with the laryngoscope as a yellow spot visible through the mucous membrane of the vocal cords to which this process gives attachment. The arytenoid cartilages are connected at their apices with the epiglottis by means of the aryteno-epiglottidean—or, for brevity, the ary-epiglottic folds (Fig. VI., 11, 13, and 12, 14), and with the thyroid (in addition to the bond of union afforded by the vocal cords) by the thyro-arytenoid liga-

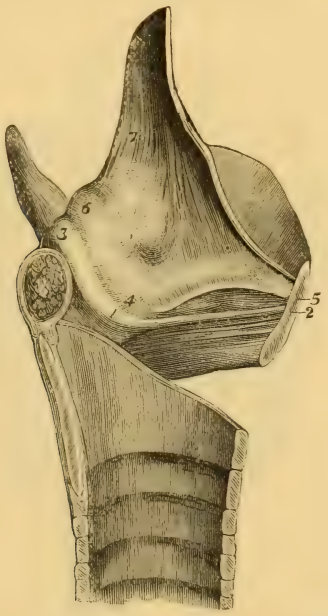

FIG. V.—SIDE VIEW OF THE LARYNX, SHOWING THE LEFT VENTRICLE OF MORGAGNI AND THE LEFT ARY-EPIGLOTTIC LIGAMENT.

1, 2. Left vocal cord.
3. Elevation indicating the site of the left cartilage of Santorini.
4, 5, 2, 1. Entrance to left ventricle of Morgagni.
4, 5. Left ventricular band (false vocal cord).
6. Elevation indicating the site of the left cartilage of Wrisberg, with the cuneiform cartilage running down to 4.
7. Aryteno-epiglottidean (ary-epiglottic) ligament.
8. Arytenoideus muscle.

ments (ventricular bands or false vocal cords, Fig. V., 4, 5), which are attached to their anterior surface.

The **Cartilages of Santorini** (Fig. V., 3) are situated above the upper pointed extremities of the arytenoids. They are conical in shape, small, and very pliant. Their function is probably to protect the apices of the arytenoid cartilages from the pressure of the epiglottis during deglutition, and to prevent that cartilage from too completely closing the air-way. [3]Elsberg therefore appropriately named them the ' Buffer cartilages.' Their use will be better under-

stood by reference to the larynx of the ox, where it will be seen that they effectively prevent, on account of their large size, any very extensive lid-like action on the part of the epiglottis.

The **Cartilages of Wrisberg** (Fig. VI., 11, 12), or the cuneiform cartilages (Fig. VI., 18, 19), are two little wedge-shaped bodies embedded in the ary-epiglottic fold (Fig. VI., 11, 13, and 12, 14) in front of the arytenoids, and are surrounded by the glands of Morgagni. They terminate above in two rounded projections immediately in front of the cartilages of Santorini (Fig. VI., 9 and 10),

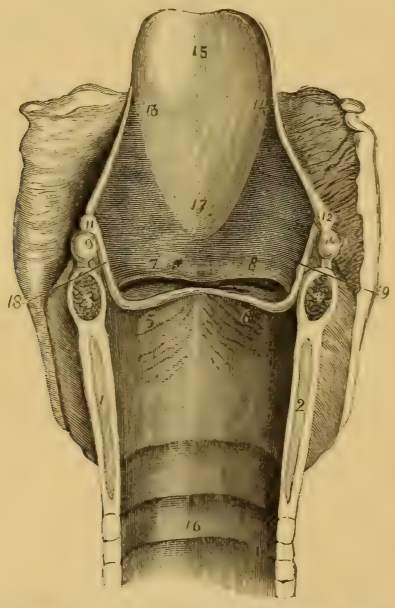

FIG. VI.—VIEW OF THE LARYNX OPENED FROM BEHIND.

1, 2. Cricoid cartilage.
3, 4. Arytenoideus muscle (cutaneous).
5 and 6. Vocal cords.
5, 7, 6, 8. Entrances to ventricles of Morgagni.
7 and 8. Superior Thyro-arytenoid ligaments (ventricular bands).
9 and 10. Cartilages of Santorini.
11 and 12. Cartilages of Wrisberg.
11, 13, and 12, 14. Aryteno-epiglottidean (ary-epiglottic) ligaments.
15. Epiglottis. 16. Trachea.
17. Cushion of epiglottis.
18 and 19. Cuneiform cartilages.

and their lower ends, according to some writers, dwindle away in the direction of the anterior margin of the arytenoids; while others ascribe to them the shape of the letter L, the horizontal arm of which follows the direction of the vocal cords (Fig. VI., 5 and 6).

Bland Sutton has shown that the cartilages of Santorini and Wrisberg are vestigial structures representing lateral extensions of the epiglottis which pass back to the arytenoid region in some of the lower mammals.

The **Posterior sesamoid cartilages,** discovered by Luschka, are not invariably present, but, being frequently found in both sexes, they nevertheless deserve some notice. They are very small, oblong in shape, and are attached, by means of delicate ligaments, above to the cartilages of Santorini, and below to the arytenoids. Their position is close to the lateral margin of the arytenoid cartilages, where these are surmounted by the cartilages of Santorini.

The **Anterior sesamoid cartilages** (Fig. XII., 11 and 12), each scarcely larger than the head of a pin, are embedded in the anterior part of the vocal cords, and they are united to the thyroid by means of a tough tissue which never ossifies, and which serves as a point of attachment not only for the vocal cords, but also for the thyro-arytenoidei interni muscles. The existence of the anterior sesamoid cartilages is the rule rather than the exception.

The **Inter-arytenoid cartilage** is a little body which is sometimes found between the arytenoids. It was first noticed by Luschka, who describes a case in which it had the appearance of a yellowish prominence, that might easily have been mistaken for an abscess when seen with the laryngoscope. It is but very exceptionally present.

The **Epiglottis** (Fig. VI., 15) is a single leaf-like piece of yellow fibro-cartilage, resembling an obovate leaf. It is sometimes described as being connected to the base of the tongue by three glosso-epiglottidean ligaments. On laryngoscopic and other inspection three folds of mucous membrane, one central and two lateral, can undoubtedly be seen passing from the epiglottis to the base of the tongue, but [5]Mayo Collier has recently contended that only the centre one of these folds contains any ligamentous tissue, the two lateral ligaments of the epiglottis passing not to the base of the tongue, but to join that part of the pharyngeal aponeurosis which is situated externally to the faucial tonsils. The organ is also connected to the arytenoid region by two folds of mucous membrane, the aryteno-epiglottidean folds, which latter contain the cartilages of Wrisberg and Santorini and the ary-epiglottici muscles; these folds, therefore, like the opposing lateral glosso-epiglottidean folds, are potential, though not true, ligaments in man, as they contain no elastic tissue. The true ligaments usually described, and readily demonstrable, are, the thyro-epiglottidean, which connects the lower end of the epiglottis to the notch in the upper border of the thyroid cartilage, and the hyo-epiglottidean ligament, which passes between the front of the epiglottis and the whole length of the hyoid bone.

A good deal of discussion has lately taken place as to the position, movements, and function of the epiglottis. In a paper read at the International Medical Congress at Washington, 1877, my colleague, [6]Mr. Carmalt Jones, submitted as the result of extended laryngoscopic observations that the epiglottis did not shut over the larynx like a lid in deglutition as commonly held, but curled in laterally like a split tube, in order to allow the food to pass down by its sides into the pyriform fossæ. During the last year this subject has been thrashed out at the Anatomical Society, with the result that the correctness of the above views is pretty generally conceded, and the greater importance of the epiglottis in respiration and voice-production insisted on. There is little doubt that the soft palate above and the epiglottis below, together form a partition or diaphragm by which the respiratory air is shut off from the oral cavity during ordinary normal breathing through the nose. The upright position of the epiglottis enables it to act as a wall, which prevents the oral and nasal secretions entering the larynx. [7]Professor Howse, from the fact that the epiglottis exceptionally occupies an intra-narial position in some animals, argues that this is the primitive condition of the organ. This is probably going too far. It is curious that the epiglottis is essentially a mammalian structure; only a few birds, such as the swan, possessing even a rudimentary organ, and it must be remembered that in birds the larynx is not the organ of voice.

The correspondence between [8]Dr. Foulis, and [9]Dr. Howard, [10]Dr. Bowles and others, has brought out the fact that the epiglottis, except for the action of the ary-epiglottidean muscles on its lateral margins, is not a very movable organ in itself. There is no doubt that it can be raised by direct traction on the hyoid bone through the hyo-epiglottidean ligament, or indirectly through the action of the muscles which pass from that bone to the tongue and jaw; but Howard's method of extreme extension of the neck to relieve respiratory troubles during anæsthesia is scarcely likely to find favour as the 'only true way' of giving such relief in operations performed on the throat and nose, for the very simple reason that Howard's method presupposes the absence of marked nasal obstruction, a factor complicating probably three out of four patients operated on in this special domain.

The cavity of the larynx is divided into three compartments; the first and largest (**supra-glottic**) is that which lies above the ventricular bands, and is heart-shaped, the broader part being situated anteriorly and corresponding to the line of the epiglottis,

the lateral walls being formed by the folds connecting the epiglottis with the arytenoid cartilages.

The second or **glottic** division is that part which comprises the ventricular bands (Fig. VI., 7 and 8), the vocal cords (Fig. VI., 5 and 6), and the ventricles of Morgagni.

The **Ventricular Bands,** formerly called false vocal cords, are longitudinal glandular folds of mucous membrane containing a little fibrous tissue (superior thyro-arytenoid ligaments). Anteriorly they are attached to the thyroid (Fig. V., 5) and posteriorly to the anterior surface of the arytenoid cartilages. They are capable of being closely approximated, and by this means the upper division of the cavity of the larynx is separated from the two lower ones, thus forming a narrow tube with a closed bottom. This closure of the ventricular bands takes place at the moment of deglutition, and in many other muscular efforts, such as in coughing, straining, and bearing down.

The **Vocal Cords,** bands, tongues, reeds, ligaments, or lips (Figs. V., 1, 2 and VI., 5 and 6), as they have been variously called, and which are, in fact, the inferior thyro-arytenoid ligaments, are two ledges or bands composed of yellow elastic tissue, covered with a thin, closely adherent layer of mucous membrane, and admitting of elongation and contraction according to the relative position of the cartilages from which they spring. Their length, when at rest, is in the male about three-fourths of an inch; in the female about half an inch. The exact attachments of the cords to the thyroid and to the arytenoids respectively have been explained above, but it has to be noted that they are in no sense of the nature of strings. Their contour on section is not round but triangular, and their shape is therefore that of a prism; the bases are firmly attached along their whole length to the thyroid cartilages, and neither the superior nor inferior surfaces are entirely free, only their thin opposing edges—that portion which would on section constitute the apices of the triangles. In strong contrast with the red ventricular bands the vocal cords are white, and this is particularly well marked in women. Bland Sutton has recently put forth the view that the vocal cords are morphologically really only the metamorphosed inner edges of the thyro-arytenoid muscles which have become tendinous, in order to give a central attachment to some of the muscular fibres and as better adapted to vocal function. The objection that tendons do not usually contain yellow elastic tissue necessitates the further assumption, on this hypothesis, that this latter development is to be accounted for by specialization of function.

The **Ventricles of Morgagni** (Fig. VI., 5, 7 and 6, 8) are two pockets or pouches in the lateral walls of the cavity of the larynx, the entrances to which are bounded above by the ventricular bands and below by the vocal cords. They are oblong in shape, and vary very greatly in size in different individuals. They do not, as a rule, reach as far as the corresponding part of the upper margin of the thyroid cartilage, but occasionally they extend beyond it; sometimes indeed they may be traced to just beneath the mucous membrane, at the posterior part of the root of the tongue. The ventricles are invested with a layer of cellular tissue, but they are also partly in contact with fibres of the thyro-arytenoid (Fig. IV., 1, 2, 3, 4), and of the thyro-epiglottic muscles. They are more-

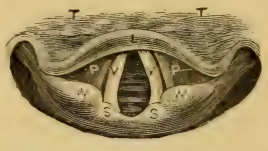

FIG. VII.—THE LARYNX IN GENTLE BREATHING.

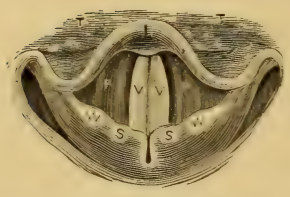

FIG. VIII.—THE LARYNX IN TONE PRODUCTION.

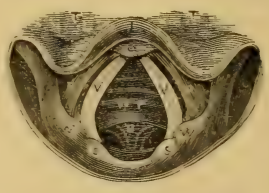

FIG. IX.—THE LARYNX IN DEEP BREATHING.

T. Tongue.
V, V. Vocal cords.
W, W. Cartilages of Wrisberg.
L. Epiglottis.
P, P. Ventricular bands, or pocket ligaments, formerly called false vocal cords.
B. Bifurcation of trachea.
C. Cushion of epiglottis.
S, S. Cartilages of Santorini.

over surrounded by muciparous glands and a large amount of lymphoid tissue ('laryngeal tonsil' of [11]Hill), which reach down to the lateral attachments of the surface of the vocal cords. A further account of the glandular structures of the ventricle will be found at chap. xii.

The **Sacculus laryngis** is a small unimportant vestigial structure in man, representing those air sacs which extend from the larynx over the front of the neck and chest, even as far as the armpits, in anthropoid and other apes.

The third, or **infra-glottic** division, is that portion of the larynx which extends from the inferior surface of the vocal cords to the lower border of the cricoid—the beginning of the trachea. The second division of the larynx is, in the physiological as well as in

a clinical sense, the most important of the three; for not only by the action of air expired from the lungs on to the vocal cords is vocal sound actually produced, but these same vocal cords play a prominent part in the function of respiration. This narrow orifice may well be termed 'the portal of the breath of life.' Technically, it is called the **Glottis**, or, more correctly, **Rima Glottidis** (chink of the glottis). The rima glottidis in repose is more or less elliptical in shape (*see* Plate X., Fig. 92; and Fig. VII.), longer in the male than in the female, measuring nearly one inch in the former and two or three lines less in the latter. The form of the rima glottidis varies greatly in different actions of the cords, being almost closed in the production of certain vocal notes (Fig. VIII.), while in full inspiration its form is irregularly triangular (Fig. IX.), the apex being anteriorly at the thyroid angle, whence the vocal cords arise (anterior commissure of the vocal cords); the two posterior angles at the arytenoid cartilages, where the same cords are inserted, the base, which is somewhat curved, being formed by the space between these cartilages (inter-arytenoid space, or posterior commissure of the vocal cords).

We have now to treat of the functional movements of the vocal cords, which are regulated by certain muscles.

Of these it will be sufficient to enumerate those known as the intrinsic muscles of the larynx, which may be classified somewhat as follows:

ACTION OF MUSCLES.

I.—Narrowing the Vestibule.

Thyro-ary-epiglottidei	Ary-epiglottici Thyro-epiglottidei	Respiratory.
Arytenoideus		

II.—Governing the Shape of the Rima Glottidis.

Thyro-arytenoidei ex- and interni Crico-arytenoidei laterales	Close true glottis	Vocal and respiratory.
Arytenoideus	closes cartilaginous glottis	
Crico-arytenoidei postici	open glottis	Respiratory.

III.—Governing the Pitch of the Voice.

Crico-thyroidei Crico-arytenoidei postici	Tense the vocal cords.
Thyro-arytenoidei interni	Shorten, relax, and bring in apposition the vocal cords.

The **Crico-arytenoidei postici** (Fig. X., 18 and 19) are the separators or abductors of the vocal cords, and are called into action on inspiration. They are two triangular muscles, the bases of which are attached to the posterior part of the cricoid cartilage, from which origin they converge upwards and outwards in

such a manner as eventually to grasp the processi musculares of the arytenoids (Fig. III., 4). By drawing these backwards and inwards the processi vocales (Fig. III., 3) are moved outwards, and the rima glottidis is thus thrown open. The extent to which this takes place depends, of course, upon the varying requirements of deep or ordinary respiration.

[12]Carl Merkel and [13]Professor Turner have described an occasional additional muscle of the larynx which when present exists unsymmetrically, *i.e.*, only on one side. It arises close to the

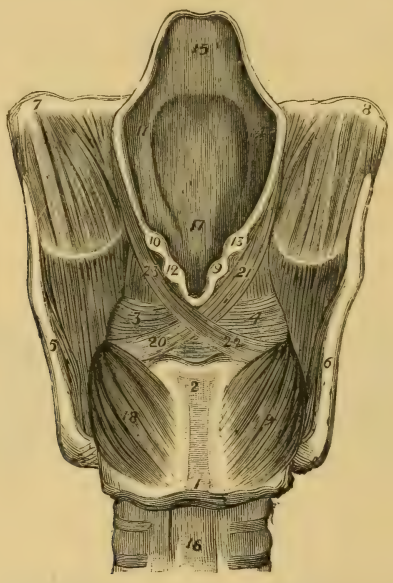

FIG. X.—THE MUSCLES OF THE LARNYX SEEN FROM BEHIND.

1, 2. Cricoid cartilage.
3, 4. Arytenoideus muscle.
5 and 6. Thyroid cartilage.
7, 8. Hyoid bone.
9 and 12. Cartilages of Santorini.
10 and 13. Cartilages of Wrisberg.
11, 15, 14. Epiglottis.
16. Trachea.
17. Thicker (cushion) portion of epiglottis.
18 and 19. Crico-arytenoidei posterior muscles.
20, 21 and 22, 23. Arytenoidei constrictores vestibuli laryngis muscles.

origin of the outer or anterior fibres of the crico-arytenoideus posticus, so that it appears as an additional portion of the same. It does not, however, pass upwards with this last muscle, but extends obliquely upwards and outwards, and after a short course is attached to the posterior margin of the inferior horn of the thyroid cartilages. The inferior laryngeal nerve passes under it, and the kerato-cricoid ligament crosses it at nearly a right angle. The entire muscle is about 3-4‴ long, and it has received the name of the **Kerato-cricoid.** Merkel does not attach importance to its action, which is supposed to fix the lower horn of the thyroid

backwards and downwards, and thus to oppose in some measure the portion of the crico-thyroid muscle connected to the anterior margin of the horn. The frequency of appearance of this muscle is given by Turner as about 21 per cent. The same observer's examination modifies Merkel's statement that the muscle is always unilateral.

The **Crico-arytenoidei laterales** (Fig. IV., 5, 7) have their origin along the upper border and on the outer surface of the sides of the cricoid cartilage, and they are directed obliquely upwards and backwards, to be inserted into the outer angles of the bases (the processi musculares) of the arytenoid cartilages (Fig. III., 4). The action of these muscles is to rotate the processi vocales (Fig. III., 3) inwards, thereby approximating the vocal cords in phonation.

The **Arytenoideus** (Fig. X., 3, 4) is a square muscle, which is attached to the posterior concave aspect of the arytenoid cartilages, and it serves to assist the crico-arytenoidei laterales in closing the glottis. If the action of the arytenoideus precedes that of the crico-arytenoidei laterales, then the rima glottidis takes for a moment a rhomboid shape; if, on the other hand, the action of the crico-arytenoidei laterales precedes that of the arytenoideus, then the vocal cords will be approximated, while the space between the arytenoid cartilages remains open. If the arytenoideus be paralyzed, then the rima glottidis takes this latter shape permanently during phonation (Plate X., Fig. 99).

The **Thyro-arytenoidei** (Fig. IV., 1, 2, 3, 4) are broad flat muscles running parallel with the vocal cords, by which they are partly covered. These muscles are attached posteriorly to the outer borders, lower part of outer surfaces and vocal processes of the arytenoid cartilages, and anteriorly to the receding angle of the thyroid cartilage in its lower half, and to the crico-thyroid membrane. Various sub-divisions of these muscles have been made, but for practical purposes it is sufficient to consider only two, namely, the *external* and the *internal*. When the thyro-arytenoidei externi contract they draw forward the arytenoid cartilages, and cause the cricoid to move downwards and forwards, thus opposing the crico-thyroid (Fig. XI., 1, 2, 3), and thereby slackening the vocal cords. The actions of the crico-thyroidei and the thyro-arytenoidei externi are, therefore, antagonistic. The former are tensors or elongators, and the latter shorteners or relaxors, of the vocal cords. The thyro-arytenoidei have, however, the additional important function of moving onward the vocal process, thus pressing together the inner edges of the vocal

cords in phonation, while the special purpose of the internal fibres which pass from the arytenoid cartilage to the cord and from one part of the cord to another, is to regulate the finer gradations in the shape of the vocal chink during singing. The thyro-arytenoidei have been called the *vocal muscles*—a name which they well deserve, for, when they are paralyzed, total loss of voice is the result. Their description would not be complete without mentioning two additional external bundles of fibres which pass to the epiglottis, one on either side, which, although they assist in narrowing the rima glottis, are said also to approximate the ventricular bands (Fig. VI., 7, 8), compress the sacculus laryngis, and depress the epiglottis.

The **Ary-epiglottici** (Fig. VI., 20, 21, and 22, 23) are two thin flat muscles which, arising from the outer and posterior border of the arytenoid cartilages, pass upwards and over to the opposite side through the ary-epiglottic folds to the epiglottis, encircling in their route the tapering points of the arytenoids just below the cartilages of Santorini, and then stretching across the cuneiform cartilages. These muscles have received the names of the *constrictores vestibuli laryngis.* They tend to bring together the lips of the arytenoid cartilages and to make the epiglottis curve inwards at its edges, assuming the shape somewhat of a split tube during deglutition. They also probably exercise the same action, and perhaps aid in depressing the upper part of the epiglottis during phonation.

The **Crico-thyroidei** (Fig. XI., 1, 2, 3) are the only intrinsic muscles of the larynx perceptible from the outside of the throat. Each of them consists of two bundles, which together present a fan-like appearance. Their lower ends are pointed, and arise from the antero-lateral portions of the cricoid cartilage ; the fibres, diverging, pass obliquely upwards and backwards, to be inserted, some into the lower borders of the thyroid cartilage, and a few others into its internal and external surfaces near the borders. The action of these muscles is to draw the thyroid forwards and downwards, thereby putting the vocal cords on the stretch. [14]Majendie, in 1813, maintained a contrary opinion of the action of these muscles, asserting that they draw the cricoid cartilage up towards the thyroid, and this view has recently been revived, especially by [15]Hooper, of Boston, who, after numerous experiments, confirms Majendie's statements. Practically the point is not one of great importance, since the effect of the muscular movement is, in either case, equally to stretch the vocal cords. The latest writer on this subject, [16]Desvernine, says that

he attributes to the crico-thyroid muscles an active part in regulating both the longitudinal and transverse diameter of the cords: 'If the larynx is in the respiratory position then it draws up the anterior segment of the cricoid, the arytenoid is depressed, the free border of the bands relaxed, and thus, indirectly, it co-operates with the thyro-arytenoideus to their transverse tension. If, on the contrary, the larynx is more or less suspended, then its contraction is resolved in a displacement, backwards and upwards, of the cricoid, the bands are powerfully elongated, the transverse diameter reduced, and it opposes at the free border of the bands,

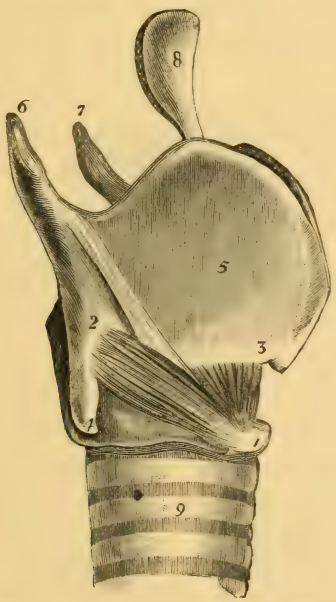

FIG. XI.—SIDE VIEW OF THE LARYNX, SHOWING THE RIGHT CRICO-THYROID MUSCLE.

1, 2, 3. Crico-thyroideus muscle.
4. Right inferior cornua of thyroid.
5. Thyroid cartilage.
6, 7. Superior cornua of thyroid.
8. Epiglottis.
9. Trachea.

through the thyro-arytenoid ligament, the required resistance to the impinging blast of air.'

The **arteries** which supply blood to the larynx are branches derived from the superior and inferior thyroid, the former of which is a branch of the external carotid and the latter of the thyroid axis from the subclavian.

The **nerves** of the larynx are the superior laryngeal and the inferior or recurrent laryngeal, both branches of the pneumogastric, together with a few filaments from the sympathetic. The mucous membrane of the larynx and the crico-thyroid muscles

are supplied by the superior laryngeal, and the remaining muscles by the recurrent laryngeal, the arytenoideus receiving filaments from both. It is essential to bear in mind the course of these recurrent nerves, which is not the same on both sides. On the right side the nerve arises in front of the subclavian artery, winds round that vessel from before backwards, and then ascends obliquely to the side of the trachea behind the common carotid and inferior thyroid arteries. On the left side it arises in front of the arch of the aorta, round which it turns to gain the side of the trachea. This branch of laryngeal anatomy, and especially the physiological aspect of laryngeal innervation, will of necessity be referred to in greater detail when treating of the 'Neuroses of the Larynx.'

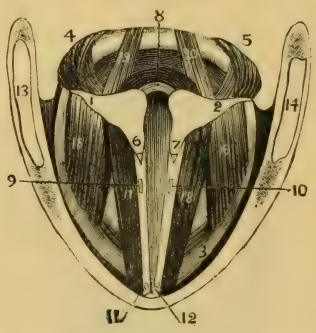

FIG. XII.—VIEW OF A SECTION OF THE LARYNX FROM ABOVE.

1, 2. Processi musculares of the arytenoids.
3, 3. Cricoid cartilage.
4, 1 and 5, 2. Posterior crico-arytenoidei muscles.
6, 7. Processi vocales of arytenoids.
6, 11 and 7, 12. Vocal cords.
8. Arytenoideus muscle.
9 and 10. Elsberg's 'vocal nodules.
11 and 12. Sesamoid cartilages.
13 and 14. Thyroid cartilage.
15 and 16. Crico-arytenoidei laterales muscles.
17 and 18. Thyro-arytenoidei muscles.
19 and 20. Crico-arytenoid ligaments.

The **Mucous Membrane** of the larynx is continuous with that of the mouth and pharynx, and extends along the trachea to the minute bronchi. The epithelium is of the ciliated variety, except over a portion of the epiglottis, the upper surface of the ventricular bands, and over the vocal cords, where it is squamous. The laryngeal mucous membrane is studded with numerous muciparous glands, which exist in especially large numbers on the epiglottis, the ary-epiglottic fold, and the inner surface of the sacculus laryngis, while on the vocal cords none are found. [17]Heitler has found lymphoid tissue in the ary-epiglottic folds, and in the mucous membrane covering the arytenoid cartilages. There is a large aggregation lining the ventricle, to which Hill has given the name of the *laryngeal tonsil*, on the ground that its function is analogous to that of the faucial tonsil, namely, the secretion of

scavenging leucocytes for, in this case, the removal of small particles—*e.g.*, dust and germs from the vocal cords. Surgically the laryngeal mucous lining is of importance in relation to its varying thickness and amount of submucous tissue in different situations, and the consequently varying liability of different portions to inflammation and serous infiltration (œdema).

The portions so liable are in order of degree the ary-epiglottic folds, the ventricular bands and ventricles, and the inferior laryngeal surface of the epiglottis. The lymphatics of this region empty themselves into the deep cervical glands—they are described more fully at Chapter XXII. in their relation to malignant disease.

The **Trachea** (Fig. I., 14) extends from the cricoid cartilage to its bifurcation opposite the fourth dorsal vertebra. It is about four and a half inches in length, and three-quarters of an inch in breadth, and is convex in front, but somewhat flattened behind. It is built up of cartilaginous rings, regular above, irregular below, from sixteen to twenty in number. They are deficient behind, and are attached to each other by fibrous tissue. Behind, bands of muscular fibres stretch across, which, by their contraction, serve to lessen the calibre of the tube. It is lined by mucous membrane, covered with columnar ciliated epithelium, and contains much lymphoid and mucous glandular tissue.

It divides into two bronchi, one for each lung, that for the right being the larger of the two. Foreign bodies falling down the tube are said generally to drop into the right bronchus. From some recent statistics made by [18]Cheadle, however, it would appear that they as frequently pass down the left. It must be remembered that the right bronchus, though the larger, is also the more horizontal, but the left runs more nearly in the same direction as the trachea. Bodies would no doubt always go to the left were it not that the pathway in that direction is smaller, and that the septum marking the division of the two bronchi, is situated to the left of the tracheal axis, so that bodies hitting this septum are often diverted into the larger right bronchus.

While the essential function of the larynx is, as its name implies, in reference to phonation or voice-production, it has certain duties to perform in the course of deglutition and respiration. During the passage of food over its superior aperture, the whole organ is drawn upwards and forwards under the base of the tongue, following to some extent the movements of the hyoid bone, to which, as has been seen, it is attached by ligamentous and muscular structures. The epiglottis (Fig. IX., 8) is curled laterally, forming a narrow tubular entrance for air from the nose

to the larynx, and lid-like closure is somewhat prevented by the presence of the cartilages of Santorini (Fig. X., 9 and 12). Approximation of the ventricular bands also takes place, together with a constriction of the vestibule or first part of the larynx, to aid, and in some cases to replace, the action of the epiglottis.

During respiration a rhythmical movement of the vocal cords takes place, the *rima glottidis*, or interval between the cords, enlarging during inspiration and becoming smaller during expiration.

It may be noted as a clinical fact that if inspiration be unduly forced, the rima, as seen by the laryngoscope, is in such circumstances frequently narrowed rather than increased. This may be due either to the opposing muscles being brought into play, or simply to the impact of air on the concave upper surfaces of the cords leading to an approximation of the adjacent free edges.

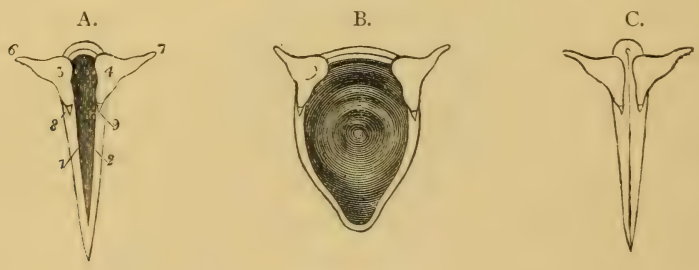

FIG. XIII.

A. GLOTTIS IN REPOSE. B. GLOTTIS IN DEEP INSPIRATION. C. GLOTTIS IN THE PRODUCTION OF TONE.

1, 2. Vocal cords.
3, 4. Section of the arytenoid cartilages.
5. Elastic band.
6, 7. Processi musculares of arytenoids.
8, 9. Processi vocales of arytenoids.

For purposes of phonation the vocal cords require to be accurately adjusted to allow of the production of vibration, and this is effected in part by the muscles which approximate the cords and render them parallel, and partly by other muscles, which, by altering the relative position of the cartilages, cause the cords to become more or less tense. The muscles concerned in approximating the vocal cords are the *crico-arytenoides laterales* (Fig. IV., 5, 7), which, by pulling the external processes (the *processi musculares*, Fig. III., 4) of the arytenoids forwards, rotate the interior processes to which the vocal cords are attached (the *processi vocales*, Fig. III., 3) inward, and consequently bring them nearer to one another. By the contraction of the muscle which stretches from the back of one arytenoid cartilage to the other—the arytenoideus (Fig. XII., 8)—the cords are rendered parallel.

They are rendered tense by the action of the crico-thyroid muscles (Fig. XI., 1, 2, 3) which tilt the thyroid cartilage forwards, upon the cricoid, thus elongating the cords and putting them on the stretch ; this tension can be increased by the compression of the thyro-arytenoidei muscles (Fig. IV., 1, 2, 3, 4), which muscles also tend to bring the free borders of the cords into more perfect apposition. When so adjusted the impact of the expired air against the cords sets them in vibration, and these vibrations are communicated to the column of air passing between them, the two sets of vibrations constituting *vocal tone;* this being modified by the movements of the lips, tongue, soft palate, and teeth, becomes articulate speech.

Considered as a musical instrument, the human larynx is far too delicate and complicated a structure to admit of adequate comparison with any known musical instrument. The subject of pitch requires more space than can here be given to its consideration. (See Chap. IV.) It is not only dependent on the tension, length, and thickness of the vocal cords, but in a measure also upon the variations in length of the tube itself from the cricoid cartilage upwards. It is doubtful whether the trachea plays any important part in this respect, though it has been suggested that in accordance with a general law, 'the calibre and length of the wind-pipe is less in short people than in tall, and, therefore, that persons with high voices are generally short in stature. Where the singer is tall, with tenor or soprano range, it has been thought that the wind-pipe branches off very high up, thus lessening the length of the tube, and that the wind-pipe and larynx are disproportionate to the stature ; the opposite condition obtaining where persons of short stature have low voices.'

The ventricular bands, or, as they were formerly termed, the 'false vocal cords' (Fig. VI., 7, 8), have no share whatever in the initial production of tone.

The function of the ventricles of Morgagni (Fig. VI., 5, 6, 7, 8) is probably to ensure greater freedom of motion to the vocal cords, and by means of the numerous glands contained in their walls to moisten the mucous membrane of the cords, a moist condition being apparently indispensable to normal voice production ; the function of the large mass of lymphoid tissue lining the ventricle in the manufacture and out-pouring of scavenging leucocytes has been previously alluded to.

THE PALATE AND PHARYNX.

It is very usual, in describing the appearance of the pharynx, to include also the appearance of the soft palate, with its pendulous process, the uvula, and the tonsils, situated one on each side of the arch between the anterior and posterior pillars.

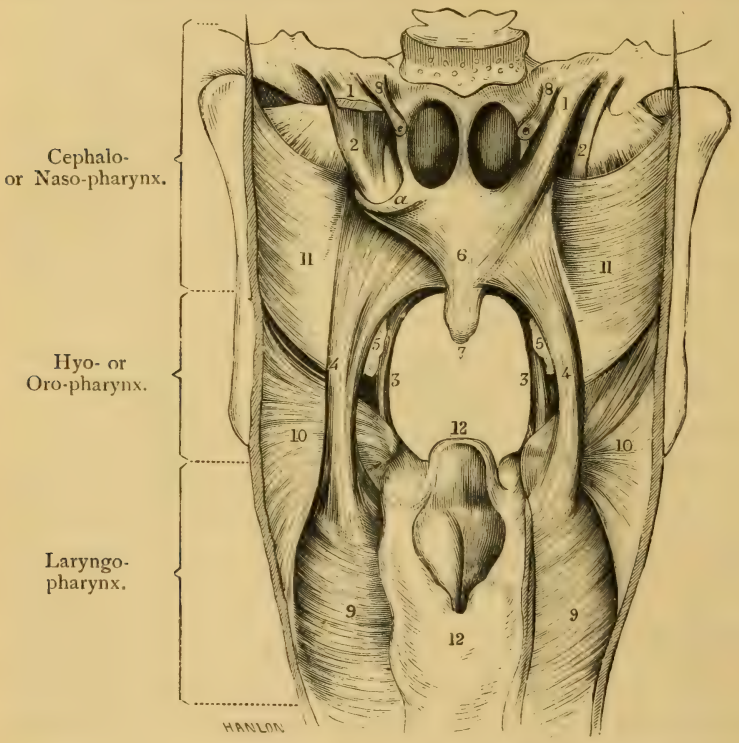

FIG. XIV.—THE MUSCLES OF THE SOFT PALATE AND PHARYNX.
(*The Pharynx laid open from behind: Modified from Gray.*)

1, 1. Levatores palati, the left being cut short near to its origin.
2, 2. Tensores palati, the left showing its reflected tendon and relation to the hamular process (*a*).
3, 3. Palato-glossi (anterior pillars of the fauces).
4, 4. Palato-pharyngei (posterior pillars of the fauces).
5, 5. Tonsils.
6. Azygos uvulæ.
7. Uvula.
8, 8. Eustachian tubes.
9, 9. Inferior constrictors (laryngo-pharyngei).
10, 10. Middle constrictors (hyo- or oro-pharyngei).
11, 11. Superior constrictors (cephalo- or naso-pharyngei).
12, 12. Epiglottis and larynx, not laid open.

There can be no objection to such a plan, but, on the contrary, there is much to be advanced in its favour, if it be remembered that the pharynx commences much higher up, and extends considerably further in a downward direction, than is seen on mere ocular inspection of the open mouth—a fact not unfrequently forgotten by young laryngoscopists.

The **Palate** forms the roof of the mouth, and may be described

as consisting of an anterior part, *hard palate*, and a posterior part, the *soft palate*.

The **Hard Palate** is limited by the alveolar processes in front and at the sides; behind it is continuous with the soft palate. The mucous membrane is here closely united with the periosteum, forming together a tough resisting membrane. There is a median ridge which terminates in front in a small papilla, which corresponds to the orifice of the anterior palatine fossa. The mucous membrane on either side is corrugated, and is covered with squamous epithelium. It contains numerous glands, which lie between the mucous membrane and the surface of the bone.

The **Soft Palate** (velum pendulum palati—Fig. XIV.) is a membranous curtain attached to the posterior border of the hard palate, and separating to some extent the cavities of the mouth and pharynx. Laterally it blends with the pharynx; but its lower border is free, and of the outline indicated in Fig. XXX. Its thickness is made up of consecutive layers of muscular fibres and aponeuroses, together with vessels, nerves, acinous glands, and lymphoid follicles (palatal tonsil); its mucous covering is continuous with that of the mouth, and is reflected back to its posterior surface. It is continued from the hard palate, and, like it, is marked with a median line or raphé, indicating its original separation into two portions; a separation which sometimes persists as a deformity, to the great detriment of the power of articulation, swallowing, etc., of the individual so afflicted.

The muscles of the palate consist of five symmetrical pairs—viz.: the *levatores palati* (Fig. XIV., 1, 1), and the *tensores palati vel dilator tubæ* (Fig. XIV., 2, 2); the *palato-glossi*, acting also in pairs as constrictors of the fauces, and constituting their anterior pillars (Fig. XIV., 3, 3); the *palato-pharyngei* (Fig. XIV., 4, 4), forming, in like manner, the posterior pillars—between these two muscles lie the faucial tonsils (Figs. XIV. and XV., 5, 5); lastly, the *azygos uvulæ* (Fig. XIV., 6), which is not a single muscle, as once supposed, but a pair of narrow, cylinder-like bundles of muscles placed side by side in the median line of the soft palate, and, together with connective and glandular tissue, forming the pendulous portion known as the *uvula* (Fig. XIV., 7, etc.).

The palatal muscles are concerned not only in the act of deglutition, but also in a greater or less degree in vocalization. The importance of the tensor and levator muscles in relation to the opening of the Eustachian tube, and consequently to the auditory functions, cannot here be more than alluded to. (See Chap. XXVIII.)

The utility of the **Uvula** has been the subject of much

speculation. It is without doubt of great service, together with the epiglottis and rest of the palate, in cutting off the oral cavity from the true respiratory channel in normal breathing. Probably it also acts as a drip-stone, conducting the nasal secretions to the glosso-epiglottic fossæ, whence they are directed by the epiglottis into the pyriform fossæ as pointed out first by Dobell, and more recently alluded to by Spicer. When relaxed abnormally, the nares are imperfectly closed in the acts of both swallowing and tone-production, and there is a general paresis of the palatal muscles.

The **Tonsils**, or amygdalæ (Fig. XIV., 5, 5), are two masses of a peculiarly composed lymphoid tissue, somewhat resembling almonds in shape. They are situated, one on each side, in the triangular depressions formed by the anterior and posterior pillars of the fauces, at a point corresponding to the angle of the jaw. Their normal size is about three-fourths of an inch by half an inch, the longest diameter being in the vertical direction. In health they should not extend beyond the level of the pillars of the fauces, though it is not unusual to see them transgress these normal limits without producing any pathological symptoms. They may also be much below the average size, with equally negative results on the health. The surface of the tonsil is perforated by a varying number of slit-like and circular depressions, the common orifices of the system of cavities which it contains. Ranged around the walls of these crypts are a number of spherical or oral lymphoid follicles or sacs embedded in the lymphoid parenchyma of the gland. If the tonsil of the rabbit, with its single crypt, be considered as a lingual follicular gland we have in man a multiplication of this to the number of from eight to eighteen. Externally they are in relation with the superior constrictor muscle of the pharynx, outside which are the internal and external carotid arteries, the internal jugular vein, and the eighth and ninth nerves. The histology of these interesting structures, together with recent researches pointing to their lymph-secreting function, will be considered at greater length when discussing the diseases of the tonsils (Chap. XI.).

The **Pharynx** (Fig. XV.), as generally considered in surgical practice, is that portion of the alimentary canal which is seen at the back of the mouth. It really extends from the under surface of the basilar process of the occipital bone above, to a point opposite the sixth cervical vertebra, and on a level with the cricoid cartilage below, where it becomes continuous with the œsophagus.

The pharynx may be described as a musculo-fibrous funnel of from four to five inches in length, and capable of a considerable amount of expansion and contraction. This funnel is widest above, and is continued upward by a dome-like roof arching from behind forward. The front part of the dome is imperfect. A good comparison is that with a carriage-hood having the front window drawn half-way down. Speaking exactly, its greatest

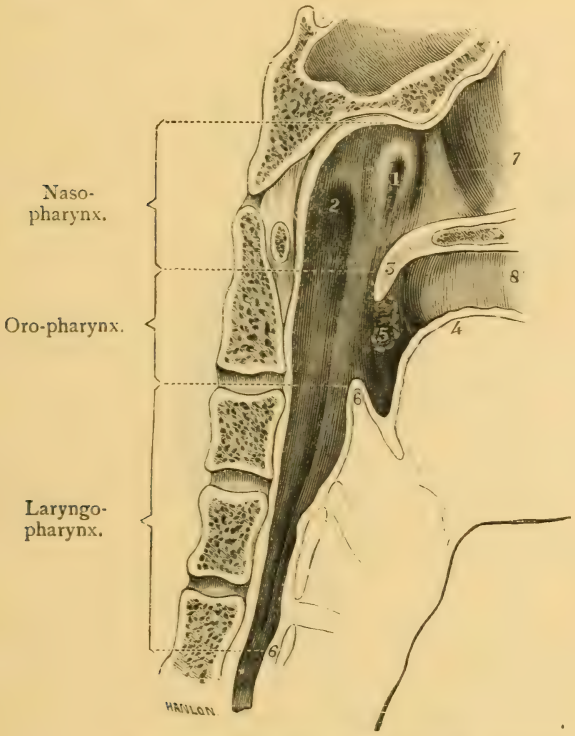

FIG. XV.—SECTIONAL VIEW OF THE PHARYNX.

1. Left Eustachian tube.
2. „ Fossa of Rosemüller.
3. Palate and uvula.
4. Tongue.
5. Left tonsil.
6, 6. Upper and lower boundary of larynx (epiglottis and cricoid cartilage).
7. Cavity of nares.
8. Cavity of mouth.

breadth is opposite the cornua of the hyoid bone; its narrowest point at its termination in the œsophagus, which commences on a level with the cricoid cartilage. It is freely movable in every direction, and is in relation *posteriorly* with the cervical portion of the spinal column as far as the sixth vertebra and its covering; *laterally*, with the common and internal carotid arteries, the internal jugular veins, the vagus, glosso-pharyngeal, and hypoglossal

nerves. *Anteriorly*, its line is broken, first, by communication at its upper extremity with the posterior nares (naso-pharynx); secondly, with the back part of the mouth (oro-pharynx); and thirdly, with the larynx (laryngo-pharynx), from which it is separated by the epiglottis (see Figs. XIV., XV., and XVI.). Failure of the soft palate and fauces to shut off the naso-pharyngeal

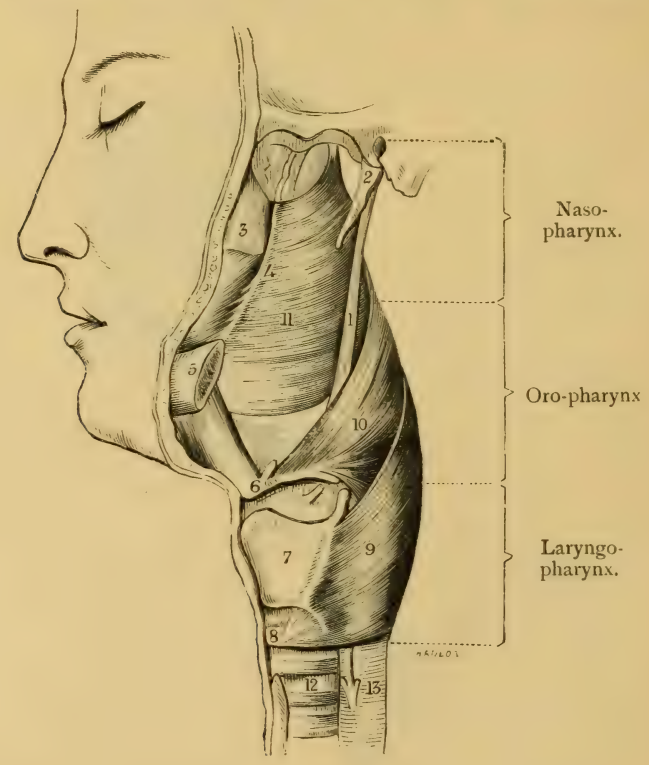

FIG. XVI.—SIDE VIEW OF MUSCLES OF PHARYNX (AFTER GRAY).

1. Stylo-pharyngeus.
2. Styloid process.
3. Upper jaw.
4. Pterygo-maxillary ligament.
5. Lower jaw.
6. Hyoid bone.
7. Thyroid cartilage.
8. Cricoid cartilage.
9. Left inferior constrictor (laryngo-pharyngeus).
10. Left middle constrictor (hyo- or oro-pharyngeus).
11. Left superior constrictor (cephalo- or naro-pharyngeus).
12. Trachea.
13. Œsophagus.

portion, or of the epiglottis to protect the larynx, in the act of swallowing, leads respectively to regurgitation of food through the nose, or its passage into the larynx. Imperfect closure of the naso-pharyngeal space is the cause of nasal tone. Hypertrophy of normal tissues, or fresh formations (enlargements of the pharyngeal tonsil or adenoid growths, polypi, etc.), causing obstruction of that

region, lead not only to impediment to healthy respiration through the nostrils, the natural respiratory passages, but also to defective nasal resonance—a very different thing from nasal tone, though the two terms are often wrongly used as interchangeable and similar. Such obstruction of the naso-pharynx is also provocative of deafness; for it is in the nasal portion of the pharynx that communication takes place, by means of the Eustachian tube (Fig. XIV., 8, 8; and Fig. XV., 1), with the middle ear.

The pharynx has a stong fibrous investment—the pharyngeal aponeurosis—and a mucous lining continuous with that of the mouth, nares, larynx, and Eustachian tubes. It is covered by columnar ciliated epithelium as low down as the level of the floor of the nares, below which point the epithelium is squamous. It is rich in glandular structure of the acinous and lymphoid kinds; the former generally disseminated, while the latter are found principally at the upper portion (pharyngeal tonsil) and around the orifices of the Eustachian tubes. (See Chap. XXVI.)

The duties of the pharynx in relation to free nasal respiration, tone-production, and hearing, may, notwithstanding their importance, be after all considered secondary to its main function—that of carrying the food, after mastication, from the mouth to the œsophagus. This purpose is effected by special muscles, the principal of which are the *stylo-pharyngei* (Fig. XVI., 1), the office of which is to lift up the pharynx for the reception of the bolus from the mouth; and the *pharyngeal constrictors* (Figs. XIV. and XVI., 9, 10, 11), three in number.

The first constrictor exposed, and the thickest, is the *inferior* (9), which arises from the sides of the cricoid and thyroid, and spreads backwards and inwards. The *middle* (10), which is smaller than the preceding, is fan-shaped, and arises from the hyoid bone and stylo-hyoid ligament. The *superior* (11), which is still thinner, and is square in shape, has a wide origin from the sphenoid and palate bones, and from tendinous and ligamentous tissues in the neighbourhood. They are all inserted posteriorly in the fibrous aponeurosis of the pharynx, meeting their fellows of the opposite side, the superior having also an extension of attachment to the basilar process. The position of the pharyngeal muscles is indicated in the wood engravings (Figs. XIV. and XVI.).

[19]Henle calls these three constrictors, inferior, middle, and superior, the *laryngo-pharyngeus*, *hyo-pharyngeus*, and *cephalo-pharyngeus*, from their respective relations to the larynx, the hyoid bone, and the bones of the head. It would be simpler, considering that their borders constitute the boundaries of the

three portions of the pharynx to which allusion has been made, to call them *laryngo-*, *oro-*, and *naso-pharyngei*.

The glandular structures of the pharynx are of two kinds, viz., the tubular or acinous—mucus-secreting—glands, and the lymphoid or tonsillar—lymph-secreting—glands. The acinous glands are found principally on the posterior and lateral surface of the pharynx, and on the posterior region of the soft palate. The lymphoid glandular structures include the faucial, pharyngeal, lingual, and Eustachian tubal tonsils, together with the lymphoid masses of the soft palate (palatal tonsil) and the scattered follicles of the posterior wall of the oro-pharynx (the discrete tonsil). There are also aggregated masses of lymphoid tissue situated along the lateral folds of the pharynx behind the posterior pillars, which, when enlarged, give rise to the condition known as pharyngitis hypertrophica lateralis.

Recently it has been truly said that the understanding of the lymphoid (tonsillar) tissues of the pharynx is the key to the rational treatment of sore throat.

To terminate properly the description of the pharynx we must return to its extension downwards, viz., to—

The **Œsophagus** (Fig. XVI., 13), which connects the pharynx with the stomach. Commencing at the lower border of the cricoid cartilage, opposite the sixth cervical vertebra, it extends downwards behind the trachea with a slight deviation to the left as far as the root of the neck, and again in the same direction as it passes through the chest, piercing the diaphragm opposite the ninth dorsal vertebra, and terminating in the stomach. It also curves antero-posteriorly in the plane of the spinal column. Its length is nine to ten inches, and its diameter about three-quarters of an inch. At three points, according to [20]Mouton—viz., (1) at its commencement, (2) three inches lower, and (3) as it enters the diaphragm—the diameter is lessened, and is not at these situations more than half an inch. [21]Sappey's statements on this head are more generally accepted—namely, that the calibre of the gullet gradually diminishes from its upper commencement till the level of the fourth dorsal vertebra—about the half of its length—whence it again as gradually increases to its termination at the stomach. It is therefore composed of two truncated cones united at their apices. It is composed mostly of layers of muscular fibre, striated above, non-striated below, and is lined by mucous membrane, covered with pavement epithelium. The sub-mucous coat is well marked, and contains, in addition to vessels and nerves, numerous elastic fibres.

THE NOSE.

It being proposed to include discussion of the condition of the nose in health and disease in this volume, it is desirable to remind the readers of some of its salient anatomical features. The organ consists essentially of two parts—an *external*, the nose proper, with which we need not occupy ourselves beyond saying that it is built up of cartilage and bone, lined interiorly by mucous membrane, and is divided by a median partition or septum into

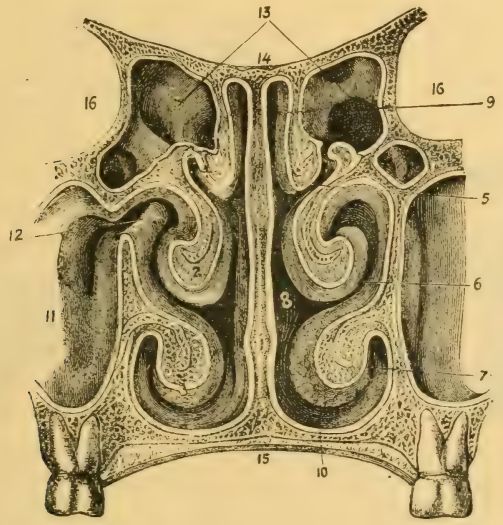

FIG. XVII.—ANTERIOR SECTION OF THE NOSTRILS (AFTER LUSCHKA).

1. Septum of the nares at position of tubercle.
2. Middle turbinated body.
3. Inferior turbinated body.
4. Superior turbinated body.
5. Superior meatus.
6. Middle meatus.
7. Inferior meatus.
8. Respiratory portion of the nares.
9. Olfactory portion.
10. Floor of the nares.
11. Cavity of right antrum.
12. Opening from antrum to nostril.
13. Ethmoid cells.
14. Roof of the nasal fossæ.
15. Floor of the nasal fossæ.
16. Cavity of orbit.

two separate orifices, the nostrils; and the *internal*, comprising the nasal fossæ. These fossæ, which are irregularly quadrilateral, or perhaps, more correctly, wedge-like in shape, are of considerable size, and open into the pharynx behind, through the posterior nares. The superficial area of each fossa is increased by the presence of the turbinated bones (Figs. XVII. and XVIII., 2, 3, and 4), three in number, which grow from its outer walls, and the posterior extremities of the two lower of which may be seen from the pharynx by means of the rhinoscopic mirror.

These turbinated bones divide each nostril into three choanæ or supplementary passages—which, with their investment of erectile tissue and mucous membrane, are known as the *turbinated bodies* —called respectively the superior, middle and inferior meatus (Fig. XVII., 5, 6, and 7), the latter constituting the floor of the nostril. The whole of the cavity is lined by the pituitary mucous membrane, everywhere firmly adherent to the subjacent periosteum, and covered in the lower or respiratory portion of the

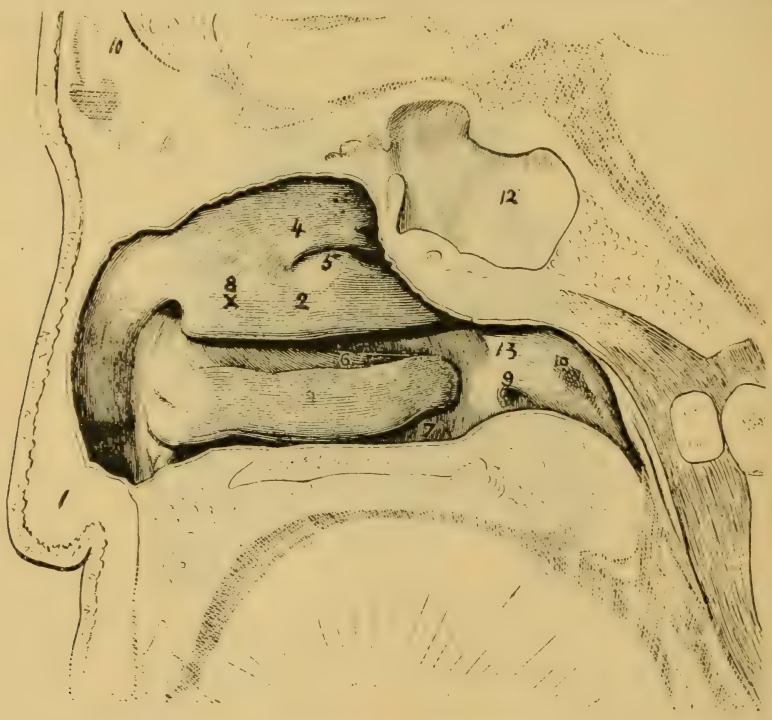

FIG. XVIII.—VERTICAL SECTION OF HEAD, SHOWING CAVITY OF NOSE.

(*From Army Medical Museum, Washington, Section* 4, *No.* 2352.)

1. Nasal vestibule.
2. Middle turbinated body.
3. Inferior turbinated body.
4. Superior turbinated body.
5. Superior meatus.
6. Middle meatus.
7. Inferior meatus, and floor of nostril.
8. Position of opening into antrum behind middle turbinal.
9. Orifice of Eustachian tube.
10. Fossa of Rosemüller.
11. Frontal sinus.
12. Sphenoidal cells.
13. Posterior limit of nares.
14. Uvula, and soft palate.

cavity with columnar ciliated epithelium; while in the region corresponding to the distribution of the olfactory nerve the cilia are absent, and there is a peculiar and special arrangement of nerve termini for the purpose of olfaction. Everywhere there is an abundant supply of muciparous and serous glands, secreting the viscid, tenacious mucus, whence the expression 'pituitary' is

derived. The regional anatomy and relations of these parts will be further considered in the description of the rhinoscopic image. Their anatomical aspects will also be better appreciated by reference to a vertical section of the nasal cavity in Fig. XVIII.

The peculiar arrangement of the turbinated bones and the thickness of the mucous membrane narrow the passages left for the transmission of air, so that not only are solid particles likely to be arrested by the moist, sticky walls, but provision is thus made for warming and moistening the air prior to its entrance into the lungs.

The nasal cavities communicate with the ethmoidal (Fig. XVII., 13), frontal and sphenoidal sinuses, and the antrum of Highmore (Fig. XVIII, 11, 12, and 8), all of which are lined by a prolongation of the nasal mucous membrane, and together constitute what are known as the accessory cavities of the nose.

The nose is generally described as the organ of the sense of smell, but it must not be forgotten that it has an equally important function to discharge in relation to respiration. In fact, of its three passages, two are devoted to respiration, and only one to the olfactory apparatus. It is also to be noted that on the condition of the nasal cavity depends largely the resonance and tone-quality of the voice. In connection with the function of the nostrils as part of the respiratory tract, the peculiar structure of some portions of the mucous membrane is of importance. That portion which covers the lower and anterior borders of the middle and inferior turbinated bones is peculiarly vascular, and constitutes a typically erectile structure, the physiological purpose of which is doubtless to catch obnoxious particles that would otherwise enter the air-passages. Turgescence of this erectile tissue in catarrhal inflammation leads to the obstruction so characteristic of the complaint. Irritation of these sites moreover, according to [22]John N. Mackenzie, of Baltimore, who has made valuable contributions on questions of nasal pathology, causes reflex attacks of cough; and he has noticed cases where troublesome and long-continued cough, unaccounted for elsewhere, has been cured by emollient applications to these spots. The same observer has also drawn attention to the fact that there is a very distinct and close relation, anatomical and functional, between this erectile structure and the sexual apparatus, and he has afforded several evidences, both physiological and pathological, in support of his views.

The **Eustachian tube** (Fig. XIV., 8; Fig. XV., 1; and Fig. XVIII., 9) is a canal of small calibre, about one line in diameter,

by means of which a communication is maintained between the middle ear and the naso-pharynx, and the pressure of air on both sides of the membrana tympani is thus equalized. Its length is from one and a half to two inches, and it runs from the pharynx upwards, outwards, and backwards. It consists partly of bone and partly of cartilage and fibrous tissue, and is lined by a continuation of the mucous membrane of the pharynx.

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CHAPTER II.

EXAMINATION OF THE THROAT AND LARYNX.—THE LARYNGOSCOPE.

It is difficult, by a mere verbal description, to explain clearly any process requiring technical apparatus and skill, and one practical lesson is of more value than a dozen pages of written directions.

Our purpose being, however, to make laryngoscopy intelligible to those who are unable to avail themselves of personal instruction, this will probably be best effected by enumerating and describing, somewhat dogmatically, the steps to be taken in making a laryngoscopic examination. The most probable causes of failure will then be pointed out, with directions how to avoid those which depend on the observer, and to overcome those which are due to obstacles pertaining to the patient; pursuing thus precisely the same course as if personally instructing a pupil at hospital.

It is impossible to overestimate the value of good illumination in facilitating the obtaining a clear and useful view of the larynx. For this reason the question of the relative merits of the different sources of light will be gone into as thoroughly as possible. In the treacherous climate of England, and especially of London, it is almost essential to have recourse to artificial illumination, sunlight being so rarely available. Of the various forms of artificial light, that afforded by gas is, for constant use, on all accounts the best, and no lamp can be more complete than the universal rack-movement apparatus. Until the last six years all my work was done by aid of a lamp (Fig. XIX.), the light of which is in every respect similar to that of the rack-movement lamp, but the apparatus of which is constructed on the principle of the Queen's reading-lamps. This form of lamp is not only much less expensive than the rack-movement, but it can be attached to an ordinary gas-burner by an elastic tube, and can be adapted for ophthalmoscopic examination or used as an ordinary study light. The illuminating power of an Argand burner in such a lamp is given

as that of ten candles, but this is much diminished by the lens and the reflector.

Where gas cannot be obtained, any lamp, such as a Moderator, Queen's, Paraffin, or Duplex, which gives a bright steady light,

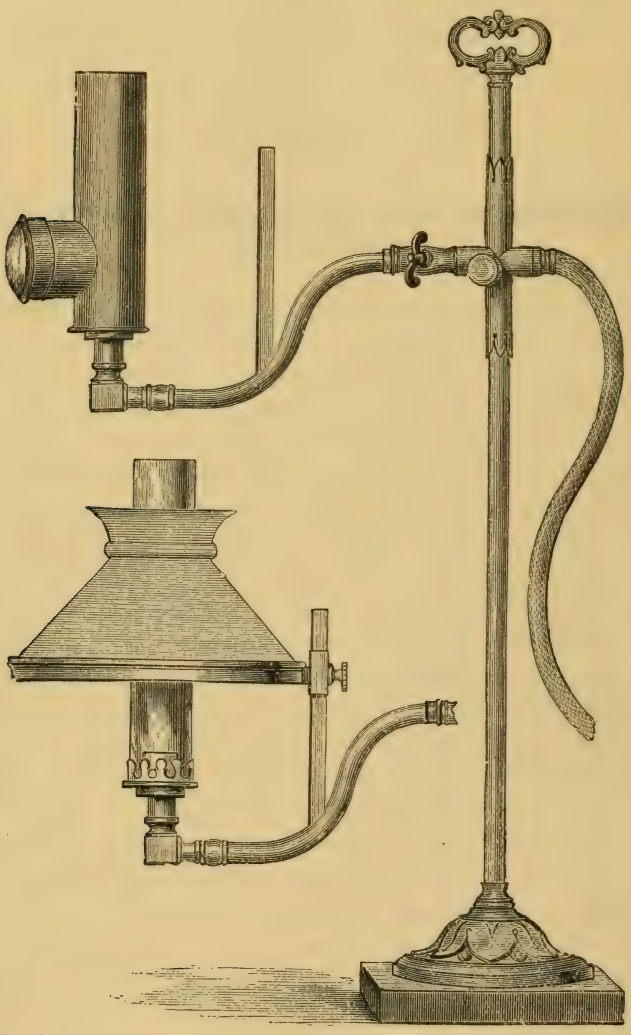

FIG. XIX.—A CONVENIENT STANDARD GAS LAMP, WITH ARGAND BURNER, WHICH CAN BE ATTACHED TO ANY GAS-JET, AND CAN BE USED FOR VARIOUS PURPOSES.

will answer the purpose; and a practised laryngoscopist may obtain a good image even with a candle in a bull's-eye lantern, or with a carriage-lamp. Several useful portable lamps are sold by the instrument-makers. Dr. George Johnson's pocket-condenser is invaluable for country practitioners; but in the absence of a

condensing lens a piece of white paper placed behind a lamp or candle will add considerably to the brilliancy of the light.

The suggestion which appeared in the *Lancet*, November 12th, 1881, to bring air or oxygen into the flame of an oil or gas lamp, is not one which can be recommended, as it is attended with risks far exceeding the benefits likely to be obtained from its use. Fortunately for the practitioner who made the proposal, his recommendations as to such a union of oxygen and coal gas appear to have been based rather on theory than actual experience. The proposal in its safer aspect had moreover been anticipated by [1]Isambert, who, as the result of long experience, recommended such a lamp as sold by Dubosq, of Paris, four years previous to the article in the *Lancet*.

As might confidently be anticipated, every effort has been made to adapt the electric light in one form or another to the exigencies of laryngoscopic examination. Nothing arranged up to the present time can, however, be considered altogether satisfactory. While this source of illumination has many qualities to recommend it, the expensive and cumbersome apparatus which its employment for the most part involves, the uncertainty of primary batteries, and the waste of accumulators, together with the technical knowledge required to conduct the delicate manipulations necessary to perfect working of the generators, render it inconvenient and unreliable, as well as costly. The Arc light is not yet—nor is it, I venture to think, likely to be— available, and the illuminating powers of incandescent lamps suitable for the purpose under consideration is even less than that of most coal-gas and oil-lamps already at command. Among instruments of this description, that known as Trouvé's Electric Photophore merits notice. It consists of an incandescent light of at the most four-candle power, fixed into a small lantern with a bull's-eye lens. This is intended to be strapped around the forehead, the electricity being conveyed to it by means of wires connecting the battery and the lamp. The drawbacks of this invention are obvious. Apart from the comparatively feeble illuminating power, and yellow colour of the incandescent light, the weight of the apparatus, and the inconvenience of the wires which convey the current, were found, when used by my colleagues and myself at the Central Throat and Ear Hospital, to constitute serious impediments to its general adoption. We found, moreover, a great difficulty in regulating the light obtained, which, generally insufficient, is by a very slight movement of regulation made so intense as to destroy the delicate carbon filament, and this at once involves the substitution of a

new lamp in its entirety. It is also to be noted that in this, as in almost all other forms of electric light for these examinations, some form of artificial heat is necessary in order to warm the laryngeal mirror—an absolutely indispensable measure in every laryngoscopic examination (*vide* p. 49). Another contrivance is the 'Nitze-Leiter' apparatus, which we carefully tested some years ago at the Throat and Ear Hospital, but abandoned on account of its cumbrous character, imperfect illuminating power, and more especially on account of the irritation its heat occasioned in spite of an elaborate system of water-irrigation. It is right to say that these experiments were made when the material to be illuminated was platinum. Since the introduction of carbon filaments, the light of these mirror-lamps is greatly increased, while the transmitted heat is also much less than on their first introduction.

Messrs. Coxeter have more recently manufactured several very neat, light instruments, in which a small incandescent lamp is combined with the laryngeal mirror (Fig. XX.); but the light—

FIG. XX.—A LARYNGEAL MIRROR WITH INCANDESCENT LAMP.

not exceeding one-candle power —which they generate is not sufficient to outweigh the disadvantages already described, and applying to them also, although in a lesser degree. The lamp being placed in the axis of the mirror distinctly interrupts the vision.

Beyond the fact that fluid chemicals are usually employed to generate the current, there is, moreover, some risk of the spontaneous fracture of these incandescent lamps, in which event the fragments would be very likely to fall into the larynx and give rise to troublesome, not to say dangerous, symptoms. Further, the examination of the fauces, throat, etc., on which great stress has been laid, as a preliminary to every laryngoscopic examination, is not practicable with these instruments. The last objection has been recently removed by Mayer and Meltzer, who have made the laryngeal mirror movable from the light carried, so that the latter can be used for examinations of fauces, nares, or auditory passages. The same firm give promise of both plates and fluid which are to last several months without renovation.

For the general practitioner, however, the ordinary gas or oil lamps at his command are amply sufficient for all purposes of

diagnosis and treatment, and are less likely to fail when wanted than any electrical contrivances at present in the market.

In connection with these inventions, Messrs. Coxeter have contrived and patented a very ingenious water-wheel dynamo-electrical machine (Fig. XXI.), whereby sufficient electricity is generated for one or several lamps. A jet of water impinging upon a wheel of small cups rotates the armature of a small dynamo, to which the spindle is fixed. As soon as the water is turned on, the current is generated. This dynamo can also be utilized to charge accumulators, and is therefore of service for the purposes of galvano-cautery—a process the great surgical merits of which will be discussed later in Chapter VI.

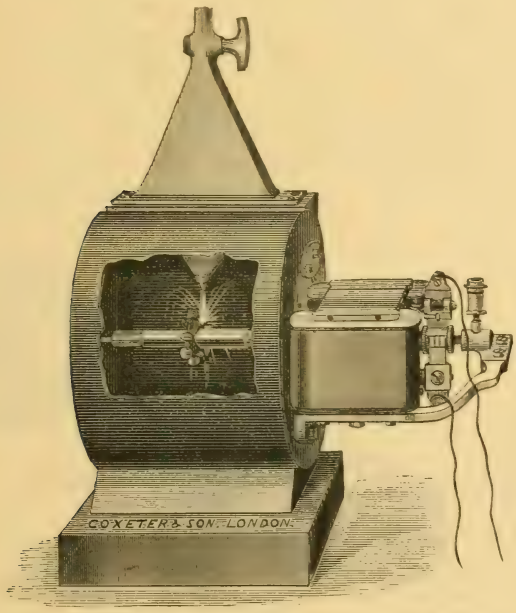

FIG. XXI.—COXETER'S WATER-WHEEL MOTOR.

Since the former edition of this work appeared, I have, after considerable trouble, succeeded in perfecting a limelight now known by my name, although I make no particular claim to originality; for the idea was suggested to me by Mr. Behnke, and the first lamps were executed under our joint direction by Messrs. Wood, of Cheapside. Various improvements in detail, the result of further experience, have since been introduced by Messrs. Coxeter, who now manufacture the apparatus as used by me. The illuminating power is not only all that can be desired, but it is at the same time economical, and easy of manipulation.

The following is a description of the apparatus, which appeared in the *Specialist* of September 1st, 1880, and to it nothing need be added except that ten years' subsequent and daily experience has amply confirmed the promise first held out of its superiority over all other methods of oxy-hydrogen illumination:

The apparatus consists essentially of the following parts:

1. The source of the light.
2. The rectifying lenses for converting the ray of light into a parallel beam.
3. The absorbment cell, for arresting the calorific rays.
4. The principal chamber for containing the various parts.
5. The igniter and dissolver, for instantaneously producing and extinguishing the light.

The various parts will be well understood by a reference to the illustration.

The Source of Light.—This is marked S in the engraving, and it consists of the most improved form of oxy-calcium jet. Two gases are required from this jet—viz., oxygen and hydrogen; but these gases do not mingle, nor do they come into contact with each other.

The hydrogen is ignited like any ordinary gas-jet, and the oxygen is then admitted, which, coming into contact with the box of the *hydrogen flame*, instantly produces a jet of enormous heating power. This jet flame impinges on the face of a cylinder of lime (marked L) immediately in front of the jet S. The lime becomes incandescent, and emits

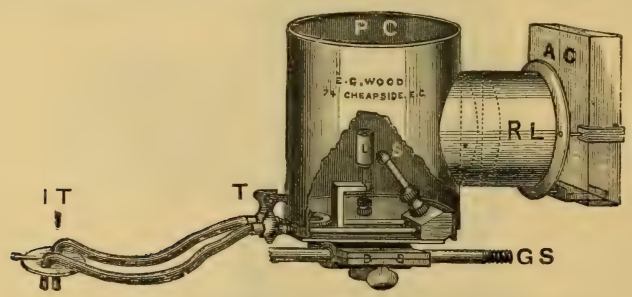

FIG. XXII.—THE LENNOX BROWNE LIMELIGHT APPARATUS.

an intense light. Two taps T are provided for the jet, one with a hole through the flat part of the key—this is the oxygen tap; the other, which is not perforated, being the hydrogen tap. By means of these taps the relative quantities of the two gases can be regulated with the greatest facility.

The hydrogen gas as employed by me is the ordinary carburetted hydrogen or street gas, and is obtained from the usual gas-fittings. The oxygen gas is used from a bag. In consequence of this arrangement only one gas-bag is required; and thus, as well as because the gases only meet at the actual point of ignition, an explosion is impossible. The oxygen gas requires the simplest apparatus for manufacture, and can be made by any intelligent man after a few minutes' instruction.

The Rectifying Lenses.—These (shown by the dotted lines, and marked R L) are required in order to change the widely divergent rays emitted from the lime into the form of a cylinder of light, the section of which is about equal to the area of the frontal mirror used by the laryngoscopist. These lenses do not require any adjustment; they are placed so that the radiant spot of the lime-cylinder is in their principal focus.

The Absorbment Cell.—This is marked A C. It is made of glass, with parallel

sides, and is held by metal clips in front of the rectifying lenses, with a sufficient space between them to allow of a free interchange of air. This cell is filled with water, which does not require changing unless the apparatus is being used for long periods without intermission. The water may even attain a considerable heat without increasing that emitted by the light.

The usefulness of the absorbment cell is shown by placing a thermometer an inch or two in front of it, in the centre of the beam of light. Under these circumstances the temperature will be seen to be scarcely raised at all; but if the cell be removed, it speedily rises to 50° or 60°.

The Principal Chamber.—This is marked P C, and it consists of a vertical brass cylinder, having on one side a tube carrying the rectifying lenses, and at its base a divided socket marked D S, by means of which it can be attached to the arm of the ordinary gas-standard G S without in any way interfering with or deranging the same. The limelight jet is also fixed in this chamber in its right position, and requires no further adjustment. It may not be out of place in this connection to mention that the limes now used are much less fragile and more durable than was formerly the case. A lime supplied with this apparatus will last for several sittings, provided it be removed after use and kept dry in a metal box. A simpler plan is to allow the small pilot-flame to remain burning, which prevents the lime becoming damp, and preserves a cylinder for a long time.

The Igniter and Dissolver.—This is the only part remaining to be described. It is marked in the illustration I T. The igniter is a specially contrived four-way tap through which the gases flow in order to supply the jet. This tap is provided with a lever handle, which moves through a regulated arc, so that by one movement the gases are turned on or off at pleasure.

When it is required that the light should be produced it is only needed that the lever, which is placed close to the hand of the operator, be moved, and the full light is instantaneously obtained. The igniter is connected with the jet by means of flexible tubes, so that the igniter can be fixed to the top of the operating table, and the jet can be raised or lowered at pleasure, so as to provide for all required conditions.

Directions for Use.—See that all the parts of the apparatus are clean and free from dust, and refill the absorbment cell with water. Put a lime-cylinder on to the lime-holder, and see that the face of the cylinder comes all but close to the sloping jet. Turn off the taps at the back of the jet, and turn the lever of the igniter to the word 'open.' See that the proper weights are on the bag containing the oxygen gas (about two half-cwts.), and open the tap of the same, and also the tap or taps that connect the apparatus with the gas main.

When this has all been done the apparatus is ready to be lighted. The hydrogen tap at the back of the jet is to be partly opened, and the gas ignited and the flame allowed to play upon the lime for a few minutes so as to heat it gradually. The oxygen tap at the back of the jet should now be gradually opened until the full amount of light is obtained; then a little more hydrogen, and then a little more oxygen may be added, until the desired result is secured. *The taps at the back of the jet will not require any more attention; the igniter performs all else that is needed.*

It will be observed that there is a screw passing through a pillar in the plate of the igniter, against which the end of the lever stops. This screw is required to regulate the length of the arc through which the lever moves, and consequently the size of the permanent hydrogen flame. As this screw is drawn back the tap is more nearly turned off, and the size of the permanent flame is decreased; whereas to the extent that the end of this screw is pushed forward the size of the permanent flame is increased.

When the apparatus is done with, the taps at the back of the jet should be turned off, as also the tap of the bag and the tap connecting the apparatus with the gas main.

Any portion of the apparatus can now be removed and put away.

The advantages of the above combination are, first, that it is exceedingly simple, and, being made to fit on to the ordinary gas-standard, does not require any cumbersome

arrangement of lantern. If from any cause it should be desirable, the whole thing can be unshipped in two minutes, and the gas-light made immediately available.

It can be used either as a direct light or with the usual frontal or hand-reflector. This is a point of considerable importance, since in the first place the direct method of examination—I speak more particularly of throats and ears—is inconvenient to those accustomed to the use of the reflector; in the second, reflected light is infinitely preferable when it is desired to follow even slight movements of the patient, as is always the case, and especially when performing operations. Needless to say, however, that the lamp is equally available for direct light.

By means of the absorbment cell the amount of heat is rendered less than that of an ordinary Argand burner.

The igniter and dissolver economise the oxygen by a movement most simple and easy to the operator.

The initial cost is very small; the expense of the one fixed at the Central Throat and Ear Hospital, including all connections, bags, etc., was only £15.

The cost of the gas, made by heating chlorate of potash and peroxide of manganese, does not exceed 1s. 3d. per bag of ten cubic feet of gas. If care be taken to avoid waste, not more than two cubic feet per hour of oxygen are necessary with the constant use of hospital practice; in other words, the cost of the light, inclusive of the carburetted hydrogen, is not more than 2d. an hour.

This limelight was tested some time since by Messrs. Silber, who estimated it as equal to fifty of their lights, or 1,000 candle-power. Candle-power is a term of very arbitrary character, and one often improperly applied. When a light is focussed on to any one point, the illuminating power is probably but a third or fourth of what would be the whole circle of the flame. I am certainly inclined to think the above estimate too liberal; and naturally the light will vary considerably, according to the quality and pressure of the gas. If condensed oxygen be used from a metal cylinder, the light is nearly twice as brilliant as when used from a bag; and the substitution of pure hydrogen for coal gas is also attended with great increase of illuminating power. In any case, at its lowest figure it far exceeds any ordinary means of illumination, and must commend itself to specialists. It is now used to the exclusion of all others, both in my private and in my hospital practice, although a careful trial has been given by myself and my colleagues to each form of electric light as it has come before the public. It has also received the approbation of many American and Continental practitioners, who have adopted it in their practice.

It has been stated that the limelight, in spite of the improvements introduced by me, still remains decidedly more expensive and cumbersome than the electric light. While not prepared to admit that this is the case, it must be borne in mind that the illuminating power, given at from 500 to 1,000 candles, and after all allowance for greater distance from the object illuminated and

for the use of reflectors, is fifty or a hundred times greater than that of the electric light with its nominal lighting power of four, and probable actual power of two, candles. I speak of the light given by a Trouvé lamp known as No. 4, which is the one generally employed.

Before proceeding to describe the method of using the laryngoscope, a brief account of the instrument itself is necessary.

Strictly speaking, the laryngoscope consists of but one instrument—namely, a small mirror, which, when placed at the back of the mouth, and illumined either by solar or artificial light, reflects the image of the cavity of the larynx, and of more or less of the trachea.

The majority of practitioners examine by the aid of indirect or reflected light, and for this purpose a second mirror is required.

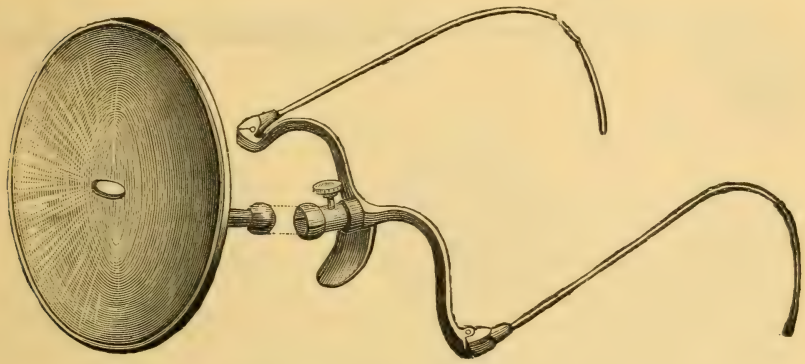

FIG. XXIII.—LARYNGEAL REFLECTOR (HALF MEASUREMENTS).

Laryngoscopy, then, as usually practised in this country, involves the use of two mirrors—one to concentrate and reflect the illuminating rays on to the fauces, and the other to throw the light thus reflected into the larynx, the image of which it in turn reproduces.

These two mirrors are called the *Reflector* and the *Laryngeal Mirror* respectively. I propose simply to describe the means and method of examination which I am in the habit of practising, without entering into minute details as to the differences in practice, by no means essential, of various laryngoscopists.

The **Reflector** (Fig. XXIII.) is a circular mirror about three and a half inches in diameter, perforated with a small hole in the centre, and fixed by a ball-and-socket joint to a kind of spectacle-frame, the lower rims of which have been removed. This is supported on the bridge of the nose by a plate of tolerably soft metal, which

can be adapted to the individual examiner. This instrument, first devised by Duplay and known in England as mine, will be found much less fatiguing for long-continued use than that of Semeleder (also called by English makers after Mackenzie), which clips the nose like ordinary spectacles. The removal of the lower instead of the upper rim is also a very real advantage, as the lower rim always comes in the way of the vision. Practitioners who are shortsighted can easily have suitable glasses fixed into this frame. The reflector should be slightly concave for use with artificial light, but plane for sunlight examination. The combination of the two in a folding frame, as long used by ophthalmoscopists, can be conveniently carried in the pocket. The usual focal distance is from eight to fourteen inches, and it is important that practitioners should obtain accurate information on this point

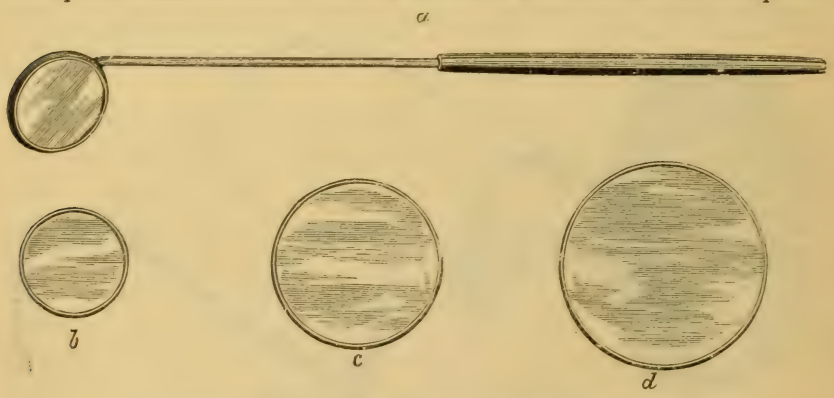

FIG. XXIV.—THE LARYNGEAL MIRROR.

a. The mirror (half measurements).
b, *c*, *d*, represent exact size of the reflecting surface of mirrors of varying dimensions.

before buying a reflector, in order that they may adapt it to their own vision, whether long or short, and may also know at what distance their head should be from the patient, so as to obtain a proper disc of light.

The reflecting mirror may be worn either over the forehead or, preferably, over the right eye, the central orifice being utilized for visual purposes; in the latter case both eyes are protected from the glare of the light—the one directly, and the other by the shadow which the reflector casts.

The **Laryngeal Mirror** (Fig. XXIV.) is circular in shape, made of glass silvered on the back, set in a German-silver frame, and attached at an angle of 120° to a slender shank of the same metal about three and a half inches in length: this shank is further fitted into an ebony or ivory handle four inches long. Quite

recently Coxeter has improved these mirrors by making the frame and shank in one piece of steel, nickel-plated.

The mirrors are about one-twelfth of an inch thick, and are made in three varying sizes, the diameters being half an inch, four-fifths of an inch, and one inch respectively.

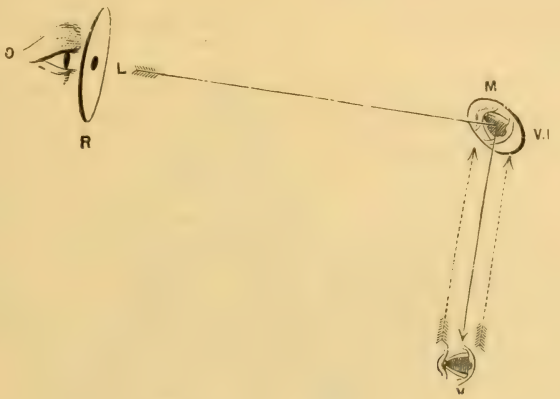

FIG. XXV.—DIAGRAM ILLUSTRATING THE PRINCIPLE OF THE LARYNGOSCOPE.

The principle on which the art of laryngoscopy is based is simply that of the well-known optical law, that when a ray of light falls on a plane surface, the angle of reflection is equal to the angle of incidence (Fig. XXV.). Thus the light (L), being thrown from the reflector (R) on to the laryngeal mirror (M) placed at the back of the mouth, illuminates the larynx (V), and, by a reduplica-

FIG. XXVI.—DIAGRAM OF LARYNGEAL MIRROR, ILLUSTRATING THE REVERSION OF THE REFLECTED IMAGE.

tion of the same law, the image (V. I) of the illuminated larynx is reflected on to the laryngeal mirror, and may there be seen by the eye of the observer (O). It is important to remember that this reflected image is laterally symmetrical of the object, and not reversed; that is to say, what is right and left in the larynx of

the patient remains right and left in the mirror. At the same time, it must of course be remembered that the patient's right corresponds with the observer's left, and *vice versâ* (Fig. XXVI.). The only inversion which takes place is in the antero-posterior direction—the epiglottis, which in the patient's larynx is in front, nearest to the observer, appearing at the upper part of the mirror, whilst the posterior part of the larynz appears in the lower part of the mirror.

The relative horizontal levels of the different parts are well preserved : the epiglottis is seen to be on a higher plane than the arytenoid cartilages, and the ventricular bands are observed above the vocal cords. As far as observation is concerned, then, the apparent antero-posterior inversion is of no importance, but it must be carefully remembered when introducing a brush or other instrument into the larynx.

With regard to the furnishing of a room for laryngoscopy, very little is required. My own room is arranged as follows : A small-seated moderately hard chair with an upright back is placed against the wall, for the patient ; in front of this is an ordinary chair or music-stool for the observer. On the left of the patient's chair is a pedestal-table, with the examining-lamp, a carafe of water, and a tumbler ; and a spittoon. The table is constructed with drawers for tongue-cloths, instruments, etc. On the right of the patient is another table with batteries and other larger instruments. It will be seen, from the simplicity of these arrangements, that laryngoscopic examinations may be made in any room. One thing is to be remembered—viz., so to place the patient that the daylight from the window and the reflected light may not be in antagonism.

To make an examination of throat and larynx the following steps must be taken in the order named :

1. Direct the patient to sit erect, with the knees together and the head slightly thrown back.

2. Arrange the lamp so that it is distant about nine inches to the left of the patient's head, and in a line with his ear.

3. Sit opposite the patient, and adjust the reflector so that the right eye looks through the central perforation. (By this arrangement *both* the observer's eyes are screened from the glare of the light, which is not the case when the reflector is worn in the centre of the forehead.)

4. Direct the patient to open the mouth widely.

5. Throw the light on to the point of junction of the uvula with the soft palate, according to the focal distance of the reflector,

and examine thoroughly the parts there exposed, such as the uvula, tonsils, fauces, and back of the pharynx. (See Chap. III.)

6. Take the laryngeal mirror in the right hand,* and slightly warm it over the lamp, to prevent its being dimmed by the moisture of the patient's breath. Test the warmth of the mirror by placing the back of it against your own hand or cheek. It

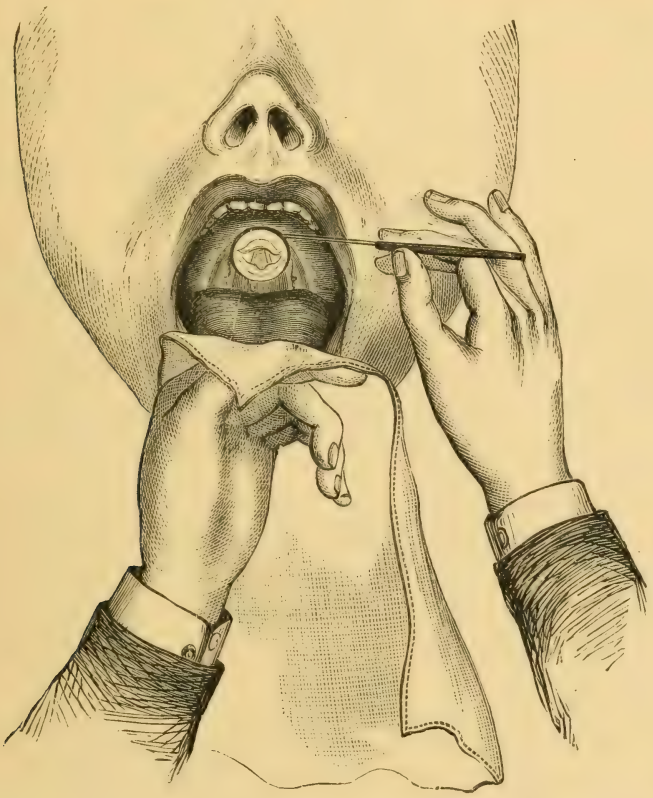

FIG. XXVII.—POSITION OF OBSERVER'S HANDS IN MAKING A LARYNGOSCOPIC EXAMINATION.

will be noticed, when holding a mirror over a lamp, that the glass becomes covered with a film of moisture, which soon clears away. The moment this moisture has disappeared, and the mirror becomes clear, the latter is at the right temperature.

* Of course, all these steps may be taken with the hands reversed; and one advantage of holding the mirror always in the left hand is, that when the right is required for operative measures, the laryngeal mirror can be held in the opposite hand without any sense of awkwardness. In this, however, as in all surgical procedures, the observer should be ambi-dextrous.

7. Direct the patient to protrude the tongue.

8. Gently draw the same forward with the left hand, previously enveloped in a small cloth or napkin, holding the organ between the thumb and index-finger (Fig. XXVII.) the former being uppermost. (See below, caution B.)

9. Holding the mirror like a pen in the right hand, and, following the curve of the hard palate, introduce it into the patient's mouth with the reflecting surface directed downwards, and then, holding it horizontally, rest its back gently against the uvula (Fig. XXVII.).

10. Turn the hand slightly towards the patient's left, so as to keep it out of the line of view.

11. Direct the patient to take a deep inspiration, and then to utter the sounds *ah*, *ur*, *eh*, or *ee*.

A view of the larynx should thus be obtained (Fig. XXVII.), and the vocal cords, which are easily recognisable by their pearly colour, should be seen separating on inspiration and approaching on phonation.

There are, however, frequently certain difficulties in the way in making a laryngoscopic examination, and they may be divided into two classes—those due to the observer, and those pertaining to the patient.

The pupil should constantly bear in mind the motto, 'Arte non vi.' He must not, because at first he sees only the base of the tongue or the upper surface of the epiglottis, at once make up his mind that the patient before him is one of those in whom it is impossible to obtain a view of the larynx. On the contrary, he must examine this same patient carefully each day until he succeeds; for it cannot be too strongly insisted on that the proportion of cases in which a skilled laryngoscopist is unable to obtain a satisfactory picture in the laryngeal mirror is *very small indeed*. Attention to the following cautions may obviate failure:

A. Be careful that the light is thoroughly well reflected, and learn to keep the disc of light *steadily* directed on to the fauces.

B. In holding the tongue, grasp it firmly but *gently*, and do not draw it down on the teeth, so as to hurt the frænum or otherwise give pain. If the tongue has any tendency to be elevated at the dorsum, it is worse than useless to pull at it, as the contraction is thereby only increased. In such cases a better view may occásionally be gained by directing the patient to hold his own tongue, or by

allowing the tongue to be kept within the mouth. This last alternative should always be adopted by preference in the case of singers, or, if possible, wherever it is desired to observe the movements of the cords in the production of tone, since traction on the tongue is apt to distort the laryngeal movements.

C. Be very careful, after warming the mirror, to test its temperature on the back of the hand or cheek, lest it be so hot as to be disagreeable to the patient.

D. Be careful not to touch the tongue with the mirror when introducing it.

E. Press the uvula very gently upwards and backwards, but do not force it against the posterior wall of the pharynx, or retching and gagging will immediately ensue.

F. When the mirror is introduced, adapt the exact angle tc the relation which the plane of the larynx bears to the position both of patient and observer, and do not too quickly decide that, because at first only the epiglottis or the posterior commissure is seen, therefore an image of the rest of the larynx is unattainable.

G. Let each examination be very short, especially on the first occasion of seeing a patient. The mirror may then be introduced six or eight times without producing spasm or nausea, whereas if the mirror be too long retained, irritation of the fauces will frequently be produced, and all efforts at further examination will, for that occasion at least, be unsuccessful. Besides the annoyance this will cause the observer, there is the fear that the patient may lose confidence and be unwilling to submit to further examination or treatment.

The difficulties on the part of the patient are either mental or physical: of the mental, the chief is the apprehension that the instrument will hurt; therefore—

H. Take the trouble, especially with children and female patients, to explain that the process is simply a method of *examination*, and that it is in no sense an operation.

I. Wherever apprehension or timidity exists on the part of the patient, it is often well to introduce the mirror gently into the mouth once or twice, and to quickly withdraw it, before any real attempt is made to examine the larynx.

Intolerance of laryngoscopy is rarely due to any physical cause on the part of the patient, but is almost always the result of

nervousness. It may, however, be caused by the disease under which the patient labours; for example, a patient suffering from simple congestion or relaxation of the mucous membrane, or from phthisis, is more intolerant of anything touching the uvula or posterior wall of the pharynx than is a patient suffering from syphilitic disease or lupus. In chronic granular hypertrophy of the vault of the pharynx there is reflex irritation, which produces spasm, retching, and gagging. In almost all affections of the motor nerves of the larynx there is some co-existent diminution of sensibility; and few cases present less difficulty in the way of satisfactory laryngoscopic examination than that of a patient suffering from functional aphonia.

Of all artificial methods of reducing intolerance of laryngoscopy none is better than to cause the patient to suck small pieces of ice for a few minutes, and should it not be available, sipping cold water, or gargling with the same by the Von Troeltsch method as described at page 102, in Chapter VII., will frequently have a similarly satisfactory effect. In more extreme cases, especially where intolerance is due to pathological causes, the painting or spraying the soft palate with a 5 or 10 per cent. solution of hydrochlorate of cocaine will render easy an examination which might otherwise have been difficult or impossible. It is better on every account to repeat application of a weak solution than to employ a stronger one as often recommended. As to instruments of the nature of the 'Throat Educator,' which the patient is frequently to introduce into his throat, so as to diminish its sensitiveness to instruments, I am bound to say that I have never yet met with cases in which such a measure was necessary. The gentle hand and encouraging word will, in my experience, do more than any other training. All mechanical appliances for holding the uvula or for fixing the patient, invariably act as hindrances rather than as aids to the observer.

The difficulties due to the conformation of the larynx itself, and the best methods of overcoming them will be treated in the description of the laryngoscopic image in the fourth chapter.

A few words remain to be said concerning **Laryngoscopy in Children.** I entirely agree with [2]Schroetter, [3]Lefferts, and others, that those physicians are mistaken who declare it to be impossible or exceptional to make a satisfactory laryngoscopic examination—or even a rhinoscopic—in the case of children; and I as emphatically dissent from the opinion of those who consider force necessary. On the contrary, such a course only leads to resistance and failure of consent to a second attempt. In my

own practice I take every step exactly as with an adult, only differing in perhaps saying less rather than more to the patient beforehand, for, telling a child that he is *not* going to be hurt is often the first suggestion that he *may* be. As to position, the child, if under seven, should be examined sitting on the lap of the mother or nurse, who is to be directed to hold herself upright and support the child against her chest with her hands, one on each side of the head. If over seven years of age I make the child stand up instead of sit, unless a chair higher than that usual for adults is available.

The chief difficulties in the way of infantile laryngoscopy are: first, the possibility that the child will not open the mouth; secondly that he will not protrude the tongue; and thirdly, that, the epiglottis being more frequently, and to a greater degree pendant in children than in adults, a view even in otherwise favourable circumstances will be unattainable or very partial. The first hindrance will, in the majority of cases, be overcome with a little patience; but should the refusal be obstinate, compression of the nostrils for a second or two will soon cause the little patient to open his mouth, from the necessity to take breath. As to the second it is by no means absolutely necessary that the tongue should be protruded; and the third obstacle, the others having been overcome, is often removed if the surgeon is on the alert to take advantage of reflex 'gagging,' which act he may even usefully stimulate by a little extra pressure of the laryngeal mirror against the fauces.

To prove that laryngoscopic procedure is not impossible, it may be noted that Fig. 55 on Plate VI. of laryngeal diphtheria, in a child aged four, was drawn from nature, and I have operated repeatedly for laryngeal growths in a child between six and seven years of age. Schroetter mentions that he has seen inside the larynx of a child six months old, and I think I may say that I have often succeeded in obtaining, if not a complete view, at least useful indications towards establishing or confirming a diagnosis in children quite as young.

Finally it may be mentioned that in the rare cases in which the obstacles to laryngoscopic examination of a child are insuperable, a view may often be obtained of the interior of the larynx, on account of its higher position in the throat in children, by rather forcible depression of the base of the tongue with a spatula. Moreover it is not at all impracticable to get a view of the larynx of the infant under influence of an anæsthetic, which may be either partial or complete. In such a case it is of course advis-

able to enforce the usual precautions of fasting from food, so as to avoid vomiting. For the purpose of examination the little patient should be held by the nurse in the ordinary laryngoscopic position. A gag is essential.

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52	2	SCHROETTER	*Monatsschrift für Ohrenheilkunde*, No. 11, 1879.
52	3	LEFFERTS.	*Archives of Laryngology*, New York, vol. i., p. 232 ; and 'Discussion,' p. 368.

CHAPTER III.

INSPECTION OF THE MOUTH, FAUCES, AND ORO-PHARYNX.

As has been indicated in Rule 5 of the steps to be taken for making examinations of the larynx (Chapter II., p. 48), thorough inspection should in all cases be made of the parts visible to the unaided eye as a preliminary to use of the mirror; first, in order that the observer may not be searching for a cause of disease in the larynx which is in truth much nearer at hand; and, secondly, because the condition of the fauces and other supra-glottic structures as seen in the open mouth will often afford valuable indications of what he may expect to see on employment of the laryngoscope or rhinoscope.

Prior, therefore, to consideration in detail of the parts comprehended in the laryngoscopic image, it will be useful to briefly pass in contemplation the various structures brought to view when the light from our reflector is thrown into the patient's open mouth. In my own practice I always attempt, in the first instance, to see the throat without employment of a spatula or tongue-depressor; but, as a matter of fact, very few patients—only such as have undergone proper training, as singers—can keep their tongue under control, and on this account some form of instrument is almost always necessary. A paper-knife or spoon-handle, always ready to hand, will frequently answer for all that is needed; but for the consulting-room a special depressor is indispensable. My own experience leads me to say that the best form of instrument is Fränkel's, the blade of which is not so broad as to cause reflex elevation of the dorsum of the tongue, while the end being fenestrated may often be utilized for lifting up the uvula. The handle is, moreover, so arranged as to keep the hand holding it away from the line of vision. This instrument as used by me is slightly different from that usually sold by the makers, inasmuch as its under surface is roughened. When in place it may be entrusted to the patient,

a valuable proviso, because pressure upon the base of the tongue (necessary in rhinoscopy) is less apt to produce retching when its amount is controlled by the patient himself.

On the first examination of a patient, and especially if made by a surgeon not accustomed to the process, gagging and retching will often occur, the tongue resisting all attempts to control it. This may often be turned to account, or even stimulated, as first advised by [1]Voltolini, when it is desired to bring more of the back of the throat into view than would otherwise be effected, especially, for instance, in cases of disease of the tonsils, pillars of the fauces, or base of the tongue ; but in order to avoid such reflex movements, certain hints may be acceptable : 1, not to place the depressor too far back on the tongue ; 2, not to exert too great pressure thereon ; and 3, to depress in the middle line, and pre-

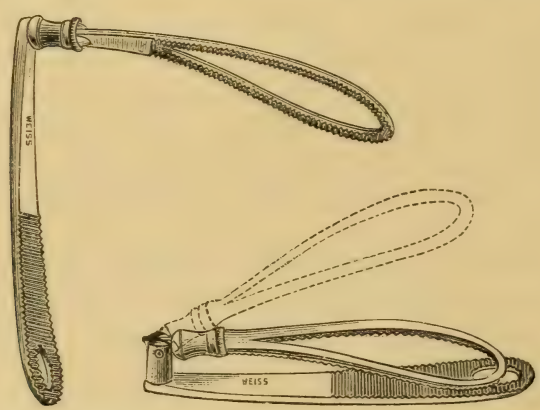

FIG. XXVIII.—HILL'S FOLDING TONGUE DEPRESSOR AND RETRACTOR (HALF MEASUREMENTS).

ferably with a narrow instrument ; observance of these hints will go far to prevent reflex contraction and arching of the tongue, which is the first and commonest hindrance to a throat examination. Hill's instrument (Fig. XXVIII.), is convenient on account of its folding and consequently greater portability, and useful because it possesses, in addition to the merits of Fränkel's depressor, a powerful retractor, which is very serviceable in examination of the base of the tongue. [2]Baber's suggestion of a thimble tongue-depressor has certain advantages, and its utility in an extended degree has long been recognised in my practice, not only for general throat examinations, but as especially serviceable for children, concerning whom two other difficulties in the way of satisfactory inspection are to be mentioned. In the first place, there is often resistance to open the mouth at all ; and, secondly,

when it is open it is often closed on the spatula as soon as introduced, or on the surgeon's finger, if imprudently placed there, a procedure which is even recommended by Cohen. These difficulties are overcome by the surgeon compressing the nostrils of the little patient with the left hand. In a couple of seconds the mouth is of necessity opened for breath, and he should then deftly introduce the instrument here depicted (Fig. XXIX.), which is the well-known lobster-claw protector, allowing free movement of the finger, with an extension as of a Fränkel tongue-depressor. For examination of the post-nasal space the extension is removed, and only the finger-guard employed; and, as will be illustrated further on, extension curettes and spoons can be fitted with similar advantages for purposes of operation in the naso-pharyngeal space, as for those of simple inspection. Directly the patient opens the mouth the surgeon will find himself further protected against being bitten, if he, with his left hand, presses the

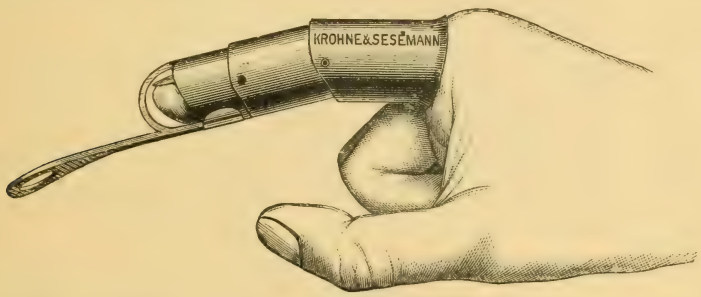

FIG. XXIX.—AUTHOR'S TONGUE SPATULA AND FINGER-GUARD COMBINED (HALF MEASUREMENTS).

The spatula extension can be inserted or removed, and the instrument used only as a finger-guard.

patient's left cheek between the upper and lower teeth. Lately I have abjured the metal guard, first, for a leather one, devised by Grant, and later, the still more simple one of Hovell, which consists of a piece of thick india-rubber tubing covering the proximal phalanx of the index finger.

The normal colour and appearances of the open mouth are sufficiently familiar even to non-medical persons to make detailed description unnecessary; and in reviewing the different parts brought into vision I shall content myself with giving brief indications of what we may learn by simple inspection, for the better diagnosis of disease, in this region. After the first general glance, which should satisfy the observer as to hyperæmia or anæmia, enlargement, inflammation, or ulceration, adventitious deposits, or new-growths on tonsils, uvula, and other parts, each separate

structure contained in the mouth may be explored, taking them in order.

1. The **Teeth** should be observed principally (*a*) for the indications of inherited diatheses of struma, syphilis, and the like; (*b*) as sources of irritation in the cases of inflammations, cracks, and ulcers in the mouth or on the tongue; (*c*) for completeness or deficiency in number, in cases of dysphagia, to be possibly accounted for by imperfect mastication, 'bolting' of the bolus, and consequent fatigue and paresis of the pharyngeal constrictors; (*d*) if any of the teeth are artificial they should for the same reason be inspected for the purpose of ascertaining whether in the case of molars the upper and lower meet so as to effect their purpose, and they should always be removed and search be made for any irritation their presence may have engendered; (*e*) as certain cases of unilateral nasal discharge may arise from abscess of the antrum, note should be made of absence of teeth or of presence of decayed stumps likely to have been the origin of suppuration in this region.

2. The **Gums** should be well examined (*a*) for indications of mercurial, lead, or other mineral poisoning; (*b*) for various inflammations, fungi, and new-growths; (*c*) for manifestations of idiopathic, syphilitic, lupous, or tuberculous ulcers; and (*d*) as an indication of the condition of health of the blood-supply (anæmia, scurvy, etc.).

3. The **Tongue** is of importance as a structure to be examined both on account of the local and general significance of its appearances. It presents many slight differences in size, surface, and firmness of texture, which are not really departures from the normal; but as there are many diseased conditions of this organ which come under the notice of the throat specialist, its varying appearances should be thoroughly studied and mastered, so that judgment can be formed as to (*a*) indications of the general constitutional state, (*b*) presence or extension of more or less local manifestations, syphilis, cancer, tubercle, ranula, etc.: and (*c*) as a cause of reflex throat symptoms, of which enlargement of the lymphoid tissue, or lingual tonsil, and varix of the base may be named. For exploration of these last the laryngeal mirror is generally necessary, though sometimes the whole tongue and even the lingual surface of the epiglottis can be seen without any such adventitious aid; and especially if, as previously stated, the depressor is placed so far back as to stimulate it to retching.

4. The **Buccal Lining** of the oral cavity is the last part to be explored before coming to the throat proper. Normally, it is

of a warm pink colour, as of boiled salmon; but its hue varies, being paler over the hard palate, where it is more firmly attached than at the sides, the lips and soft palate. Independently of the various inflammations comprehended under the term stomatitis, this region is to be viewed for syphilitic, diphtheritic, tuberculous, lupous, and other manifestations. In the cases of certain skin affections, as eczema, herpes, etc., there are often more or less analogous conditions of the oral lining.

5. The **Soft Palate and Fauces** (Fig. XXX.) hardly require detailed description. Their colour is generally that of the rest of

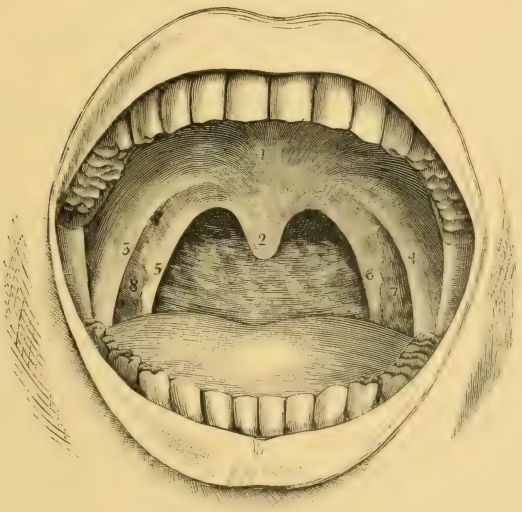

FIG. XXX.—THE SOFT PALATE.

1. Soft palate.
2. Uvula.
3 and 4. Anterior pillars of fauces.
5 and 6. Posterior pillars of fauces.
7 and 8. The tonsils.

the buccal mucous membrane, but is of deeper hue at the pillars (Fig. XXX., 3, 4, and 5, 6). Impairment of its muscular tone (paresis) is generally tested by observation of its pendulous portion.

6. The **Uvula** (Fig. XXX., 2), the anatomy of which has been already described (p. 27), is a very important structure, and its appearance greatly varies according to the method employed in its inspection. When a patient opens the mouth he generally takes a deep inspiration, which has the effect of drawing the uvula up. For the purpose of a proper examination of the uvula, the patient should be directed (*a*) to open the mouth without inspiring —this will give an idea of its usual position in repose; (*b*) to sing up the scale—this will indicate its power of contraction; (*c*) to breathe through the nostril with open mouth—this will show it in

its state of greatest laxity. By these steps, and by observation of the relative size and length of the uvula to the arch of the soft palate, data will be provided for forming a judgment as to the part played by this member in a case of throat disease. Passing further remark regarding the pillars of the fauces, the anatomy of which, as of the rest of the soft palate, has already been considered, we must note—

7. The **Tonsils** (Fig. XXX., 7 and 8) which, as previously stated (p. 28), lie between the faucial pillars. The normal range of their size, etc., varies greatly, but generally it may be stated that in health they should not protrude beyond the plane of the anterior pillars. Nor is their size the only thing to be observed, as when atrophied they may often be diseased. Needless to add also that local evidences of specific dyscrasiæ are often to be seen on the tonsils. (See Chap. XI.)

8. The amount of the **Pharynx** seen without either the laryngeal or posterior rhinoscopic mirror is that confined to the middle or oro-pharyngeal portion. In colour it is normally redder than the mucous membrane of the mouth. It is generally smooth, moist, and lustrous, but may be slightly uneven or wavy in surface within the range of health. Veins of varying distinctness and prominence are also to be seen coursing over it. [4]Cohen says: 'The pharynx often appears deeper on one side (usually the right) than the other, owing to a similar conformation of the anterior bodies of the vertebræ. When the constrictor muscles of the pharynx contract, as they often do involuntarily during inspection, they draw the posterior palatine folds, into which they have insertion, towards each other, so that they nearly or even actually meet, shutting the mouth off from the pharynx. The sensitiveness of the parts, and the amount of mucus and saliva present, vary greatly within normal limits.' This part offers important indications of disease, which may extend either upwards to the nasal or downwards to the laryngeal portion, and must therefore be thoroughly studied in regard to its colour, surface, secretion, etc.

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56	2	C. BABER.	*A Guide to Examination of the Nose*, London, 1886, p. 103.
57	3	SOLIS COHEN.	*Diseases of the Throat and Nasal Passages*, 2nd edition, New York, 1879, p. 9.
60	4	,, ,,	*Ibid.*, p. 13.

See also *Diseases of the Mouth, Throat and Nose*, by Schech, of Munich, translated into English by R. H. Blaikie, M.D., Edinburgh, 1886.

CHAPTER IV.

THE LARYNGOSCOPIC IMAGE.

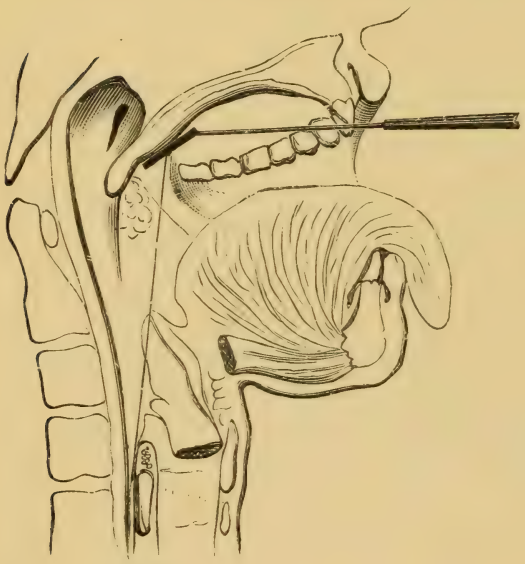
(*See Lithographic* PLATE I. *at end of Book.*)

WE have seen that the laryngoscope reveals to us an image of the interior of the larynx, and we have divided the organ, for practical purposes, into three compartments—the first, or supra-glottic; the second, or glottic; and the third, or infra-glottic, taken in order respectively from above downwards. In looking at the reflection in the laryngeal mirror of a typically healthy larynx (PLATE I., Fig. 1, at the end of this volume), all the three divisions may, on deep inspiration, be seen; but, in not a few instances, the beginner will see only the epiglottis, and perhaps the arytenoid cartilages. This may arise either from the fault of the observer, who has not sufficiently followed the directions or recognised the cautions given in the first chapter, or from the fact that the epiglottis is really so situated as to practically obstruct the view.

The accompanying woodcuts (Figs. XXXI.* and XXXII.*) show the two extremes of the views which will be obtained, according to the angle of the mirror with the perpendicular plane of the larynx, and also to the horizontal level at which the mirror is placed in the throat, as shown in Figs. XXXI. and XXXII.

Before entering minutely into the appearance presented by each structure when reflected in the mirror, PLATE I. should be carefully studied, especially the two first figures, in order that the reader may become perfectly familiar with what should be observed in the living subject. The laryngeal image will be seen to be circular in shape (though this, of course, would vary with the shape of the mirror employed) and to be bounded by well-defined walls, as would be expected at the opening of a tunnel like the larynx. The epiglottis will be seen to be attached to the base of the tongue, forming the anterior arch of the tunnel, and occupy-

ing the foremost and uppermost position in the plane of the larynx. From each side the folds connecting this valve with the arytenoid cartilages complete the circle, and in the folds may be seen the prominences of the arytenoid and their supplementary cartilages. On a lower plane are the two ventricular bands, reduplications of the mucous membrane of the larynx, containing at their free edge the thro-arytenoid ligaments. These form the floor of the first or supra-glottic division of the larynx. At first sight the ventricle shows only as a dark line between the ventricular bands forming its superior, and the oval ends forming its inferior, boundary; but



XXXI.

XXXI.*

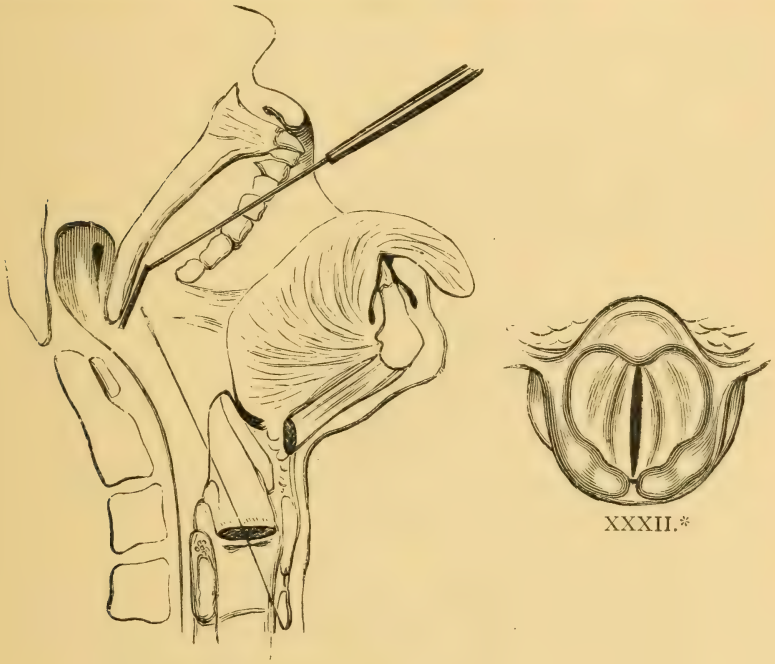
FIG. XXXI.—SECTIONAL VIEW, SHOWING THE POSITION OF THE HEAD OF THE PATIENT, AND OF THE LARYNGEAL MIRROR, WHICH WILL GIVE THE MINIMUM AMOUNT OF VIEW. THE LARYNGOSCOPIC IMAGE IN SUCH A CASE IS REPRESENTED IN THE SMALLER FIGURE AT THE SIDE, XXXI.*

on turning the mirror so as to get a lateral view of one or other side of the larynx (Fig. XXXIII., p. 62), the open space of the ventricle will be seen to be much larger than it appears when looking directly down the centre of the larynx, as is done with the usual position of the mirror. It will be further seen that, by muscular action, this space varies in shape and size in different movements of the larynx.

Below this is seen, standing out in bold relief, the superior surface of the vocal cords, which glisten like mother-of-pearl, and move to and fro with respiration and phonation. Beneath the

vocal cords are seen less completely the contents of the third or infra-glottic region. A portion of the cricoid cartilage will be observed, then some rings of the trachea, and further on, in rare and favourable cases, the bifurcation of the trachea, the right bronchus being the larger and the more visible. Outside the larynx are seen the hyoid fossæ and the anterior border of the pharynx as far as the commencement of the œsophagus.

Let us now more ultimately examine, by means of PLATE I. (which should be opened so as to lie beside these pages during



XXXII.* XXXII.

FIG. XXXII.—SECTIONAL VIEW, SHOWING THE POSITION OF THE HEAD OF THE PATIENT, AND OF THE LARYNGEAL MIRROR, WHICH WILL GIVE A FULL AMOUNT OF VIEW. THE LARYNGOSCOPIC IMAGE IN SUCH A CASE IS REPRESENTED IN THE SMALLER FIGURE AT THE SIDE, XXXII.*

perusal of the chapter), each of the structures thus seen on a general view of the larynx. All the numerals in the following description refer to this plate. And once again, the reader is reminded that in this illustration no attempt has been made to reproduce the exact colour of the mucous membrane, since its hue varies considerably in different individuals, just as may the complexion of the skin, and also because the coloration is altered according to the kind of light employed; such as sunlight, oxyhydrogen, common gas, or oil lamps.

The **Epiglottis** is in all cases the first object of which a reflection is seen in the laryngeal mirror, and appears as a leaf-like piece of fibro-cartilage connected with the tongue by three glosso-epiglottic folds; viz., two lateral (L G E F, Fig. 1), and one superior (S G E F, Fig. 7). Attaching it to the inner portion of the thyroid cartilage, just above the anterior commissure of the vocal cords (A C, Fig. 1), is seen the thyro-epiglottic fold (T E F, Fig. 2), to the pharynx the two pharyngo-epiglottic folds (P E F, Fig. 1), and to the arytenoid cartilages the two ary-epiglottic folds (A E F, Fig. 1). In some instances the sulci (anatomically termed valleculæ) are seen in the mirror on the upper surface of the epiglottis. They are situated on each side of the median line, close to the base of the tongue, and they are bounded by the superior and lateral glosso-epiglottic folds (Figs. 4, 7, and 11). These sulci are surgically important as being not uncommonly the seat of origin of specific and also of maligant ulceration.

FIG. XXXIII.—A SIDE VIEW OF THE LARYNX, SHOWING THE RIGHT VENTRICLE OF MORGAGNI OPEN.

l. Left vocal cord.

The amount of the epiglottis visible in the mirror will depend greatly on the length and degree of tension of its various ligaments; though, as has been said, it will also vary according to the position of the mirror. For example, there may be seen at one and the same time portions of the superior surface (S S E, Fig. 1), of the inferior surface (I S E), of the cushion (C E), and of the free edge or lip (L E, Fig. 2). The epiglottis may vary greatly in shape: it may be of the ordinary curve, and show a portion of both the superior and inferior surfaces, as in Figs. 1, 2, and 11; it may be so pendulous as to show but little or nothing of its inferior surface, as in Figs. 5, 7, 8, and 9; it may be angular, as in Fig. 3; folded on itself, as in Fig. 4; with lip but slightly everted and doubly curved, as in Figs. 5 and 11: with serrated or obtusely crenated edge, as in Fig. 6; or asymmetrical, as in Fig. 9; lastly, it may show none of its superior surface, but stand quite erect, as in Fig. 10.

The epiglottis may be looked upon as the distinctive feature of the larynx; for no part is so variable in shape and size; and it thus entirely controls the individuality of the organ. This is not surprising, because, as has been aptly said, there is no more reason why the epiglottis should be uniform than that all noses should be alike.

Although it is true that the epiglottis may vary considerably in shape and size, and yet not materially interfere with the view, as is seen in Figs. 1, 2, 3, 6, 8, 10, and 11; yet, in by far the majority of cases, the configuration of the epiglottis regulates the amount of the larynx visible in the mirror. In Fig. 4, for example, its peculiar form prevents the posterior part of the cords from being seen; in Fig. 5 little more, and in Fig. 7 no more, of the larynx is visible than the arytenoid cartilages. Occasionally the papillæ of the tongue may be so enlarged, and the glosso-epiglottic folds so lax, as almost entirely to hide the epiglottis (Fig. 8); and this appearance may easily be mistaken for disease of the valve itself.

In **colour** the epiglottis may be likened to the inner surface of the eyelids. It is of a warm pinkish-yellow, and not unfrequently capillary vessels may be seen ramifying over its surface (Figs. 5 and 6). The under surface is always of a deeper colour than the upper, the cushion itself being of a bright red.

During respiration the epiglottis remains erect; and although it moves with variations of vocal notes, it plays no direct part in the production of vocal sound. Its special office is to close tightly over the larynx during the passage of food into the pharynx. Any affection, therefore, which interferes with this movement will unavoidably cause discomfort to the patient during deglutition.

Above the epiglottis is seen more or less of the base of the tongue, with the folds of mucous membrane connecting these two parts, to which reference has been already made. Continuing the circle of the laryngoscopic image, there will be seen from each side, and from the under-surface of the lips of the epiglottis, the folds of mucous membrane connecting it with the arytenoid cartilages—the **aryteno-epiglottidean**, or, more shortly, the **ary-epiglottic** folds (A E F, Fig. 1). Generally, only the superior and a portion of the outer or pharyngeal aspect of these folds is visible, and from the fact that the ventricular bands (V B, Fig. 1) are altogether on a lower level, their internal or laryngeal side is not seen in the mirror. In each fold may generally be observed two rounded prominences, that nearer the epiglottis being the carti-

lage of Wrisberg (C W, Fig. 1), and that nearer the median line the **capitulum of Santorini** (C S, Fig. 1).

The two capitula of Santorini are occasionally seen to override each other, as in Fig. 10. In many cases the cartilage of Wrisberg is not seen, while in some instances a third small prominence —that of the sesamoid cartilage of Luschka—is visible between those of Wrisberg and of Santorini (Fig. 8).

Connecting the two arytenoid cartilages is the **inter-arytenoid fold** (I A F, Fig. 1), forming the posterior commissure of the vocal cords (P C, Fig. 2), and completing the circle of the framework of the larynx.

The **Ventricular Bands,** formerly called false vocal cords (V B, Fig. 1), are reduplications of the mucous membrane continuous with the ary-epiglottic folds, to which they are attached as well as to the under-surface of the epiglottis itself.

At the median line the mucous membrane of this fold is reflected back, and forms the lining of the **ventricle of Morgagni** (V M, Figs. 1 and 6), whence it again issues to cover the vocal cords, and descend into the trachea, etc. The free edge of the ventricle is somewhat curved in shape, and encloses the thin ligament (thyro-arytenoid) running from the inner surface of the angle of the thyroid cartilage, just below the insertion of the epiglottis, to the anterior surface of the arytenoid cartilage.

Occasionally the ventricular bands are over-developed, and they then approach so near to the median line in phonation as partially or completely to hide the vocal cords, as in Fig. 11; but in such a case, with the act of inspiration the vocal cords come into view.

The **colour** of the ary-epiglottic folds, as well as of the ventricular bands, is that of the mucous membrane lining the cheeks, while the portion covering the cartilages may be described as having a colour similar to that of the gums.

Beneath the ventricles are seen the **Vocal Cords** (V C, Fig. 1). They are at once recognised as two lustrous, fibrous bands, running, when closed in phonation, almost parallel in the antero-posterior direction of the larynx, and widely separating on inspiration, the widest space being posteriorly. Springing from the angle of the thyroid, and attached to the anterior angle of the arytenoid, each cord is divided into two portions—the ligamentous or anterior, and the cartilaginous or posterior. The junction of these two portions is at the point known as the vocal process (V P, Fig. 2). The exact anatomical parts representing these processes are well shown on Fig. XII., 6 and 7, p. 20. The ligamentous portion of the vocal cords is seen to be of a glistening

pearly-grey or white colour, while the cartilaginous part is often slightly pink, especially in the case of those who are constantly using the voice. This is an important point to remember, as otherwise the appearance might be mistaken for the result of disease.

It is well to notice that in some cases, on looking into the larynx, the anterior commissure is not seen, but that the posterior wall, lying in contiguity to the œsophagus, is more visible (Fig. 6). In such cases it is often, but erroneously, supposed that there is thickening of the inter-arytenoid fold.

The amount of the **Infra-glottic** division of the larynx visible in the laryngeal mirror varies considerably in different subjects. Generally, the internal surface of the anterior portion of the cricoid cartilage (C C, Fig. 1), and two, three, or more rings of the trachea will be seen (T, Fig. 1). The cartilaginous rings are of a yellowish-buff colour, the interspaces of the same hue as the laryngeal mucous membrane. In favourable subjects one may even see the tracheal bifurcation with the openings in the bronchi (R B, and L B, Fig. 1), the right being the most visible. On the outskirts of the larynx proper, but quite within the field of the laryngeal mirror, and always to be inspected, are the hyoid fossæ (H F, Fig. 1), one on each side, showing through the mucous membrane the prominences of the cornua of the hyoid bone (C H, Fig. 2). These cavities are of considerable surgical importance, as being the favourite locality for foreign bodies (PLATE VI., Fig. 54), and a frequent site of pharyngo-laryngeal cancer (PLATE IX., Figs. 89 and 90).

On looking into the larynx by means of the laryngoscope in the manner described on page 46, *et seq.*, we are enabled to follow the movements of the parts in the production of the various sounds. As already stated, the shape of the rima glottidis during ordinary quiet respiration is somewhat elliptical (Fig. VII., p. 15). If, however, the utterance of a sound (phonation) be attempted, the vocal cords are seen to be promptly approximated, and the superior thyro-arytenoid ligaments (ventricular bands) also move towards the middle line. These latter, however, *never* meet in phonation, and while they doubtless influence the quality, etc., of the voice, they are not directly concerned in voice production. As soon as sound ceases to be emitted the cords quickly return to their previous position.

There is a position of the cords which is nearly allied to that of ordinary respiration, namely, when half-way between full adduction and complete abduction. This has been termed by

Ziemssen the 'cadaveric' position, from its being the condition found *post mortem*. It might also be called the position of repose. It has a pathological interest in connection with certain disorders of innervation which will be alluded to later on.

The process of approximation as just described is subject to various modifications. For instance, in 'aspirating,' the apposition is more gradually brought about, so that a certain quantity of air has time to pass through before the cords are brought into phonation attitude. On the other hand, the closure may be absolute, either for the purpose of preventing the egress of air with a view to muscular effort or as preliminary to that violent expulsive opening which constitutes 'cough.'

For vocal purposes the cords ought to come together and be rendered suitably tense at the same time as the current of air is made to impinge upon them. By this means the musical note produced is clear and free from accessory sounds. On termina-

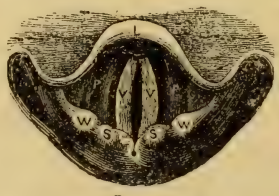


FIG. XXXIV.—LARYNGEAL IMAGE—LOWER THICK REGISTER.

T T. Tongue.
P P. Ventricular bands.
L. Epiglottis.
S S. Cartilages of Santorini.
V V. Vocal cords.
W W. Cartilages of Wrisberg.

tion of the effort, relaxation and abduction of the cords should follow or be coincident with cessation of expiration.

It may be interesting at this stage to review briefly the changes in the position of the cords which take place during the production of the different registers; a *register being understood as consisting of a series of tones which can be produced by the same mechanism* (Behnke). When a very low note is uttered, the arytenoids are seen (when not hidden from view by the epiglottis, which generally curls over to some extent during the emission of very low notes) to be closely approximated posteriorly, leaving an elliptical opening between the cords (Fig. XXXIV.). The ventricular bands are well out of the way, and allow of a good view of the cords in this position.

Somewhat higher in the scale the elliptical opening disappears, leaving a small triangular opening, with the apex pointing forward, between the processi vocales, which, in its turn, is no longer

visible when, or before, the tone is raised to the higher A note of the bass clef (Fig. XXXV.).

These notes (up to the lower F of the treble clef) are all produced by the same mechanism, viz., by vibrations of the whole length, breadth, and substance of the vocal cords, which throughout this register are comparatively thick. Hence this series of tone is spoken of as the 'thick register.' As the upper limit is approached, however, the epiglottis straightens itself gradually, and the cords are evidently subjected to great tension. This is effected chiefly by the thyroid cartilage being tilted forward by the crico-thyroid muscles impinging on the crico-thyroid membrane, a process which can be *felt* by placing the finger on the outside of the throat.

To get beyond this note without undue strain upon the cords a different mechanism is brought into play. The epiglottis is raised still more, the upper part of the larynx (the vestibule) is

FIG. XXXV.—LARYNGEAL IMAGE—UPPER THICK REGISTER.

T T. Tongue.
P P. Ventricular bands.
L. Epiglottis.
S S. Cartilages of Santorini.
V V. Vocal cords.
W W. Cartilages of Wrisberg.

made narrower and deeper, and the ventricular bands are brought nearer to one another. Moreover, by the contraction of the outer vertical fibres of the crico-thyroid muscles the diameter of the inner portion of the thyro-arytenoid muscles is diminished, and the vocal cords themselves are rendered flatter, thinner, and quite parallel. This series has been called the 'thin register.'

The thyroid cartilage resumes to a great extent its erect position, and the pre-existing strain is thus relieved. To raise the tone the same tilting forward of the thyroid again comes into play, and this suffices for about a fifth (to the middle C of the treble clef). The next change consists in the formation of an elliptical opening (Fig. XXXVII.) between the cords in lieu of the linear slit which characterized the preceding register (Fig. XXXVI.), and by this means the higher F may be reached.

Finally, in order to continue the ascending scale to the end, the posterior parts of the vocal cords are held firmly together, leaving

only a small oval orifice in the anterior part of the glottis, which becomes smaller as the voice ascends (Fig. XXXVIII.). This series has been called the 'small register,' and is only to be seen in the case of females and of boys.

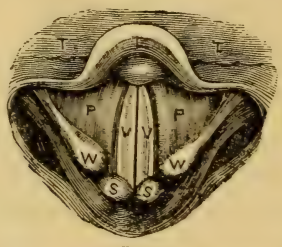


FIG. XXXVI.—LARYNGEAL IMAGE—LOWER THIN REGISTER.

T T. Tongue.
P P. Ventricular bands.
L. Epiglottis.
S S. Cartilages of Santorini.
V V. Vocal cords.
W W. Cartilages of Wrisberg.

The *pitch* of the voice is thus altered (1) by the degree of tension of the vocal cords; (2) by their thickness and width together with the condition (thick or thin, tense or lax) of their

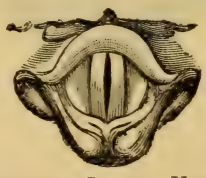


FIG. XXXVII.—LARYNGEAL IMAGE—UPPER THIN REGISTER.

free margins; (3) by the shortening of the vibrating surface caused by the close juxtaposition of more or less of their edges posteriorly; and, finally, (4) by variations in the pressure of the expired air.

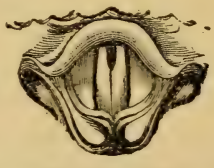
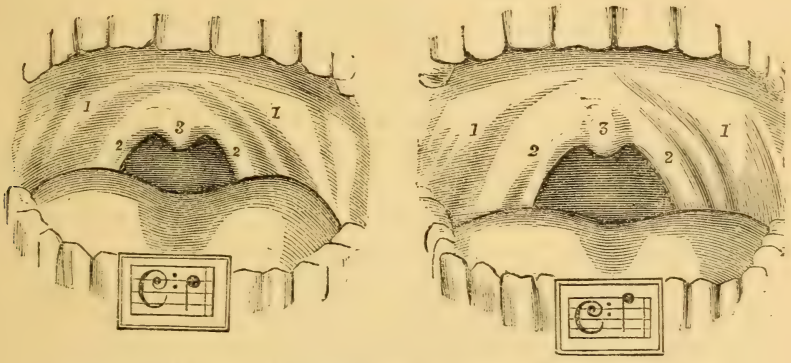


FIG. XXXVIII.—LARYNGEAL IMAGE—SMALL REGISTER.

It must, however, be borne in mind that the positions of the soft palate and uvula are also changed to some extent according to the pitch of the different tones; that the *quality* of the voice is materially affected in this region by the degree of approximation

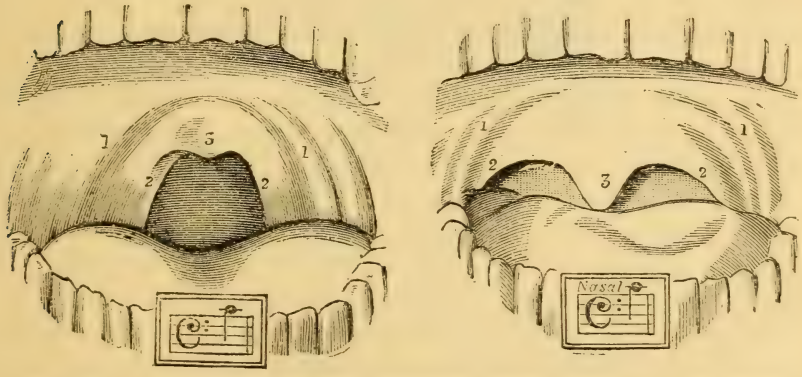
of the soft palate to the back of the pharynx, and by the greater or smaller amount of nasal escape of the tone consequent thereupon. Fig. XXXIX. shows the palate in singing F. The shape of the arch 2, 3, 2 should be remarked in order to compare it with Fig. XL., which shows the soft palate in singing the A, in



FIGS. XXXIX. AND XL.—THE SOFT PALATE IN TONE PRODUCTION.

1. Anterior pillars of the fauces. 2. Posterior pillars. 3. Uvula.

which it is seen to be much higher than in the former. The next drawing (Fig. XLI.) represents the shape of the faucial arch in singing the note C; it is both higher and narrower than



FIGS. XLI. AND XLII.—THE SOFT PALATE IN PURE PRODUCTION AND WITH NASAL TONE.

1. Anterior pillars of the fauces. 2. Posterior pillars. 3. Uvula.

before, while the uvula has contracted so much as to have almost completely disappeared. With the palate so raised and contracted the tone sung is pure and resonant.

The same note may be produced with the palate relaxed and the uvula pendant (Fig. XLII.); but it is strongly nasal in tone,

and is greatly wanting in resonance. In order to avoid any misapprehension as to the meaning of terms often employed as interchangeable, it is convenient here to say that *nasal resonance* is intended by me to signify the *normal* quality of tone accompanying a *healthy* and unimpeded condition of the naso-pharyngeal passages, with firm closure posteriorly of the soft palate against the back of the pharynx. *Impaired* nasal resonance, or *deficient* nasal resonance, is produced by anything that blocks these passages, as polypi of the nose, adenoid growths in the vault of the pharynx, or thickening of the naso-pharyngeal mucous membrane. The term *nasal tone* signifies something *abnormal*, and implies escape of the tone through the nostrils, due to imperfect contraction of the soft palate against the pharynx. The first condition exists in the 'dead' tone of a person speaking with a cold in his head; the second when he is the subject of a relaxed or paretic soft palate. It is quite possible for nasal tone to exist in combination with defective nasal resonance; but the two terms represent two distinct and different conditions, and need never be confounded in significance. The figures here inserted are tracings of photographs from life, and the whole subject has been treated in detail in *Voice, Song, and Speech*. (See also *British Medical Journal*, October 27, 1883.)

Auto-laryngoscopy.—A great deal of the difficulty which is experienced by beginners in obtaining a good view of the larynx, is attributable, not so much to intrinsic sensitiveness of the parts to be examined, as to a want of delicacy and management. One of the best ways to acquire this *tactus eruditus* and at the same time to become familiar with the appearances of a (presumably) healthy larynx, consists in practising a systematic investigation of one's own throat. No additional apparatus is required beyond a small mirror, which is so placed that the observer is enabled to see the reflection of the laryngoscopic mirror when placed *in situ* in his own throat. A very ingenious little contrivance was invented for this purpose by the late Dr. Foulis, of Glasgow, consisting of a glass globe filled with water, and surmounted by a small square mirror (Fig. XLIII.).

The rays from a candle or lamp placed behind the globe are by this means concentrated into the open mouth of the observer, who sits in front of it, holding the laryngeal mirror at the back of the throat in the manner already described. He will thus be enabled to see the resulting image in the larger mirror fixed to the globe.

Photo-laryngoscopy.—It was only to be expected, as a natural sequence of seeing into the larynx, that attempts should be made to reproduce its image by means of photography, and, indeed,

Czermak, who appears to have left very little unattempted in connection with the subject, succeeded, upwards of twenty years ago, in obtaining a picture which, although it bears on the face of it evidence of having been much retouched, is, considering the length of exposure necessary in those days, a very wonderful production. Our own process consisted in concentrating a very powerful electric light on Mr. Behnke's pharynx, he being so seated that, by means of a mirror inserted into the shutter, he could see the image in exactly the same axis as it would be in the camera.

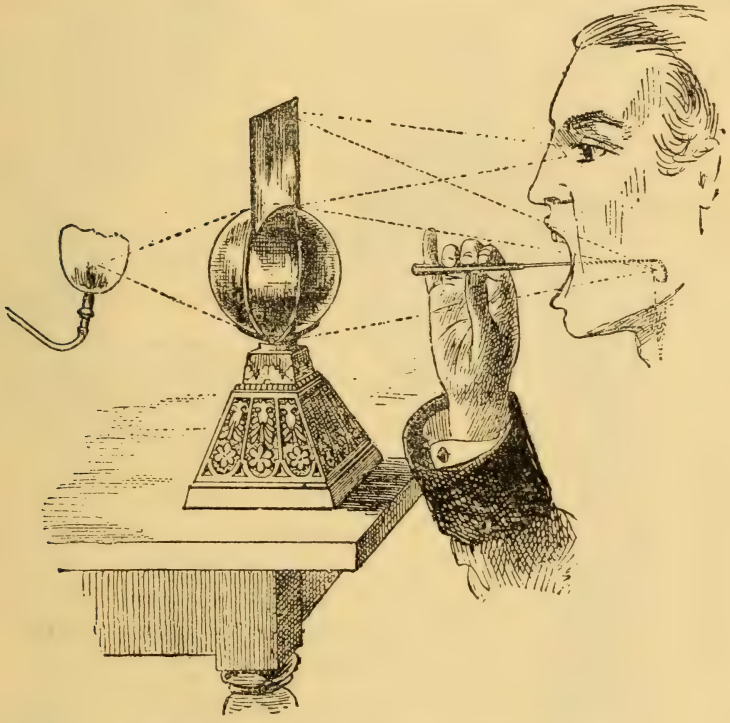


FIG. XLIII.—THE AUTO-LARYNGOSCOPE OF FOULIS.

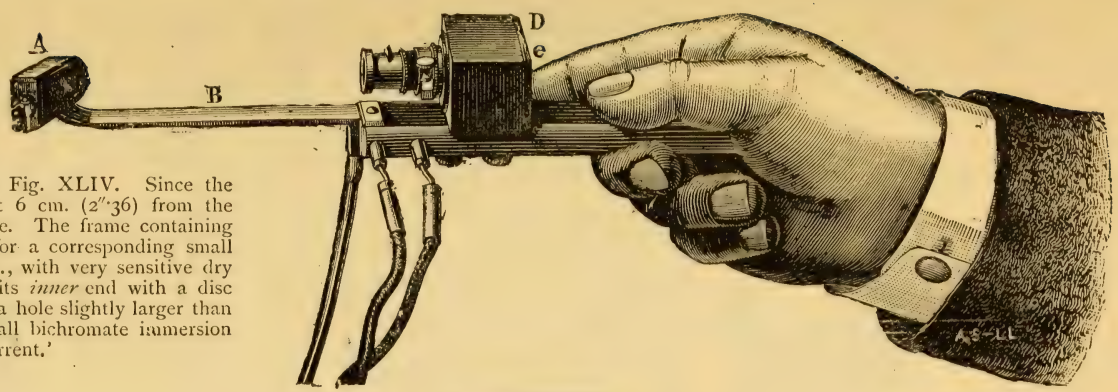
His tongue was not drawn forward, but was left flat in the mouth, so as not to distort the laryngeal image. When we were agreed as to the moment for photography he gave the signal, and an exposure of about a quarter of a second was allowed. As a result, we obtained some marvellously perfect portraits, which have been published in our joint work, *Voice, Song, and Speech*, and were exhibited by me, on magic-lantern slides, at the Liverpool meeting of the British Medical Association in 1883, on two successive days.

We were exceptionally fortunate, first, in the facilities afforded us at the Society of Arts for obtaining a magnificent Siemens electric light of 10,000 candle power for the purpose of illumination; and secondly, in the fact that Mr. Behnke, who sat for the photographs, had, by long practice, become thoroughly accustomed to the laryngeal mirror, and had also acquired the art of demonstrating his larynx not only at rest, but also in tone-production in the various registers. Dr. French, of Brooklyn, who for many years had been working at the subject on individuals totally untrained, has succeeded, after much patience, in producing very good photographs on a minute scale, capable of enlargement and reproduction. Further details of the procedure adopted by French will be found in the *Archives of Laryngology*, vol. iv., p. 235. To this gentleman belongs the honour of having first obtained a photographic image of portions of the posterior nares.

Dr. Stein, of Frankfort, who had succeeded in photographing the interior of the eye and ear, has been lately devoting himself to photography of the larynx, using for that purpose a special photo-laryngoscope. A condensed description of Dr. Stein's apparatus and process accompanies the plates illustrative thereof on the opposite page (Figs. XLIV. and XLV.).

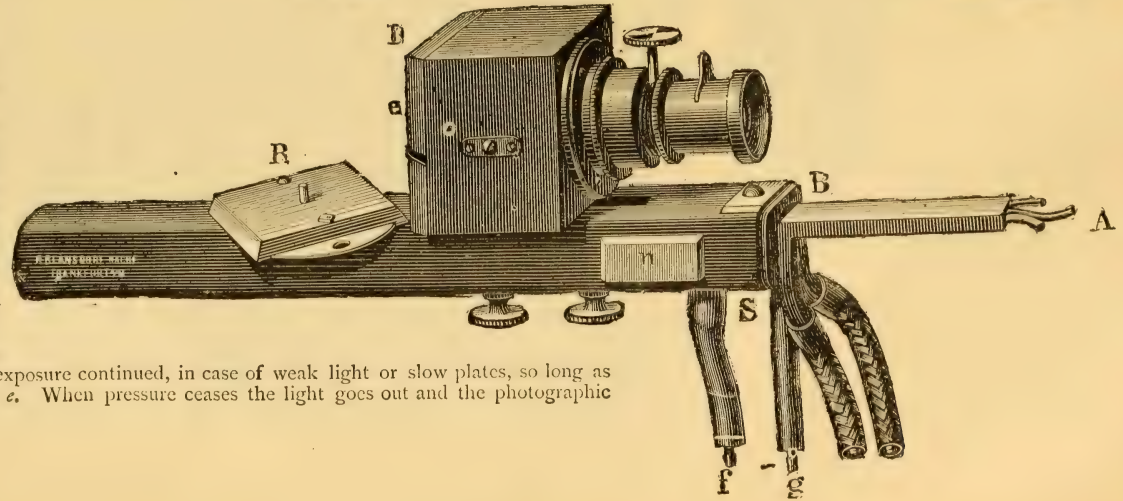
By the kindness of Mr. John B. Pearse, an enthusiastic amateur singer, and the aid of a professional photographer, I have been able to share in experiments with Stein's apparatus, but we have not succeeded in taking pictures so good as those of French, and it is indeed difficult to believe that any useful portraits of the larynx could ever be obtained by its means. However, while I fully recognise that my own facilities as a draughtsman may prejudice me in favour of the pencil over the camera, I apprehend it will be generally conceded that laryngo-photography, interesting though it be, is, at any rate at present, little more than a scientific amusement. It is suggested that the process is likely to be of service in verifying improvements, or the reverse, of laryngeal disease under treatment; but functional evidences will to the majority supply more conclusive proofs.

FIG. XLIV.



'A small camera, D, is placed on the handle, B, of a 'Nitze-Leiter' laryngoscope, A, as close to the mirror as possible. The lens has a focus of 40 mm. (1″·57), and by a fine adjustment the image on the laryngeal mirror A is sharply focussed on the ground-glass *e*, Fig. XLIV. Since the incandescent light is only about 6 cm. (2″·36) from the larynx, its illumination is intense. The frame containing the ground-glass *e* folds back for a corresponding small double dark slide R, Fig. XLV., with very sensitive dry plates. The lens is covered at its *inner* end with a disc rotated by a spring, and having a hole slightly larger than the opening of the lens. A small bichromate immersion battery generates the requisite current.'

FIG. XLV.



When the photo-laryngoscope is in position a button, *e*, is pressed by the forefinger; it makes a connection, which sends a current through the wires *f g* to the lamp, and through a small electro-magnet inside the camera. The magnet then draws off a catch holding the disc, which quickly rotates, and as its hole passes the lens an exposure is made quite automatically. The movement of the disc is said to be so arranged that the hole may be kept behind the lens and the exposure continued, in case of weak light or slow plates, so long as pressure is made on the button *e*. When pressure ceases the light goes out and the photographic action ceases.'

CHAPTER V.

RHINOSCOPY, OR EXAMINATION OF THE NASAL PASSAGES.—THE RHINOSCOPIC IMAGE.

Rhinoscopy, or investigation of the upper pharynx and the interior of the nose, has become inseparably connected with laryngoscopy, not only because of the similarity in the methods of investigation, but for anatomical and pathological reasons. For experience has taught us that in many diseases of the throat we must look to previous or simultaneous affections of the mucous membrane and submucous tissues of the nose and pharynx for their etiological elements. As a natural result, the employment of the rhinoscopic mirror and speculum has led to a greatly extended study and a consequently more perfect knowledge of the various morbid processes in the regions so brought under observation. The increased visual command thus gained has also led to greater accuracy and many improvements in the direction of topical remedies to these passages.

Anterior Rhinoscopy.—Much information as to the condition of the nasal cavity may be gained by careful inspection from the nostrils, although the comparatively small size of the aperture of necessity greatly limits the field of observation. Light, either direct or reflected, is again called into requisition, and the view of the nostrils facilitated by the use of a suitable speculum or dilator. In nasal—and, indeed, in all—instruments the great object should be to have them as simple as possible; but this is by no means universally borne in mind by instrument-makers and surgeon-inventors.

Duplay's speculum (Fig. XLVI.) was one of the first introduced, but is of rather cumbersome construction, and heavy. It is moreover not self-retaining. Fränkel's speculum (Fig. XLVII.) is the one generally employed, but is only moderately serviceable, from the fact that the small space brought into view is still further narrowed by prolapse through the fenestrations of the tissues

attempted to be dilated. The same objection applies to Cohen's hair-pin speculum, useful as it is for cases of emergency; and to the instrument of similar construction suggested by Baber, which is made self-retaining by a rather terrifying arrangement of bands

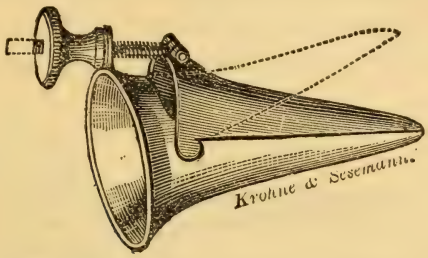


FIG. XLVI.—DUPLAY'S NASAL SPECULUM.

and buckles. Many years ago I had a Fränkel's speculum made with the fenestrations filled up, and they are now sold in that form. A further improvement has been effected by a screw, fixing the blades at the desired point of dilatation; but the instrument is at

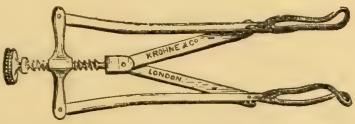


FIG. XLVII.—FRÄNKEL'S NASAL SPECULUM.

best an inconvenient one, from the peculiar curve of its dilating blades, as also from their undue length and narrowness. This last defect, that of narrowness, is an objection also to Shurley's speculum, an otherwise good instrument as far as the shape and

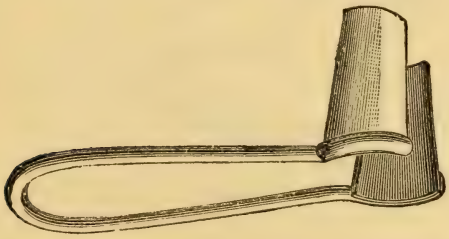


FIG. XLVIII.—THUDICHUM'S NASAL SPECULUM.

length of the blades are concerned. The principle of Thudichum's instrument (Fig. XLVIII.) is excellent, except that the spring is so strong as generally to cause great discomfort, and in some cases actual pain, to the patient. I formerly used the trivalve (Fig. XLIX.) nasal speculum of Elsberg, to which was added, at

my suggestion, a rack to keep it open at any desired width. The instrument (Fig. L.) which I have now employed for the last seven years, to the exclusion of all others, was suggested in the first instance by that of Maunder for straightening the septum. The blades are of the same shape as those in Thudichum's speculum, but are made of ivory instead of metal, so as to be more readily serviceable when the cautery is used. The bridge connecting the

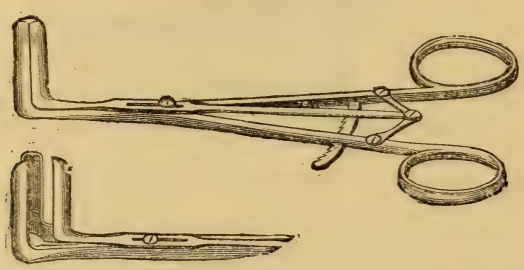


FIG. XLIX.—ELSBERG'S NASAL SPECULUM, WITH AUTHOR'S RACK MOVEMENT (HALF MEASUREMENTS).

blades is shortened by a telescopic arrangement, and being slightly resilient, allows of a delicate adjustment of the spring-force sufficient for self-retention, but not enough to cause pain or even discomfort. I was recently shown an 'improvement' of my instrument by a maker, which was of such a nature as to have improved away every feature of good that I venture to think it possesses.

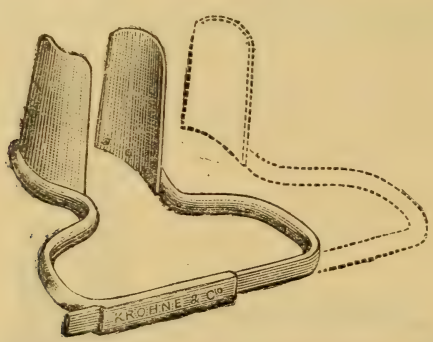


FIG. L.—AUTHOR'S NASAL SPECULUM (NEARLY FULL SIZE).

The blades were of metal, the bridge was rigid, and the amount of expansion was regulated by a screw. I have found little benefit from the use of long tubes to be introduced into the nostrils as suggested by Zaufal, the area of inspection being too limited, and the view gained being equally attainable in most cases by posterior rhinoscopy. Moreover, their introduction is generally attended by both pain and hæmorrhage.

The following are the necessary steps to be taken for anterior examination of the nose. The patient being seated, with the head thrown back and rested on the back of the chair, the observer, who sits in front of him, gently introduces the dilator and fixes it in position. The light is then focussed on the nostril to be examined, the entrance to which will then be seen as an irregular oblong cavity, and on dilatation the contents of the anterior nares come into view.

Before describing them it may be noted that for anterior rhinoscopy to be serviceable it is essential that the operator should be thoroughly acquainted with the anatomical relation of the parts he wishes to see; but as, with the best of specula, the field of vision is limited, he is obliged to frequently alter its axis in the direction of the different choanæ; and no observation can be considered complete unless the examination is thus conducted. The planes of the different parts to be inspected are so variable, however, that it is quite impossible by any sort of figure to give a useful and clear impression of what one desires to convey to others, however serviceable such an outline may be to the observer for his own purposes of reference. There are a large number of variations, especially of the septum and inferior turbinated body, as well as those depending on the degree of patency of the nostril itself, which very seriously alter the image, but which are by no means pathological, just as there are changes in the external configuration of the nose. For all these reasons, and after full deliberation, I have decided not to give any outline conventional figures of the anterior nares as first adopted by Seiler in 1879, and such as I have so long recommended for the graphic record of pathological changes in the fauces, larynx, and posterior nares.

The Anterior Rhinoscopic Image.—The first object to notice is the median septum, which separates the nostril from its fellow and is often deflected to one side or the other. On the outer side the inferior turbinated body is visible, and forms the roof of the inferior meatus of the nose, at the far end of which, in favourable cases, may be seen the movement of the palatal muscles in swallowing. By altering the axis of vision the middle and even a portion of the superior turbinated bones may be perceived.

The *septum* so frequently deviates from the mesial line that unless there is difficulty in nasal respiration, not accounted for by other circumstances, no clinical importance need be attached to the fact. Baber has the merit of first drawing attention to the importance of the *tubercle* of the septum, the varying forms and

position of which may greatly influence the appearance of the anterior rhinoscopic image; but it may be mentioned that its actual existence is by no means uniform. On the other hand, not only at the situation of the tubercle, but along the lines of suture, distinct osteo-cartilaginous spurs are not infrequently met with. Even when these do not interfere with the respiratory function of the nostrils, they may bear causal relation to certain reflex neuroses (see Chapters XXIV. and XXV.). The *inferior turbinated body* is the part which next claims our attention, and varies greatly in size and colour within the limits of health. Its mucous covering is soft and smooth, and when congested or swollen is sometimes mistaken for a polypus. At the lower border of the inferior turbinal may be seen the *inferior meatus*. The *middle turbinal* lies far higher up, and for its inspection requires that the head of the patient be set further back. The portions seen on anterior examination are the anterior and inferior surfaces. At the outer edge is the *middle meatus*, on the inner the *olfactory slit*. The *superior turbinal* is but very rarely visible by anterior rhinoscopy. The *coloration* of the parts seen from the front differs somewhat from that of the same structures as viewed by posterior rhinoscopy. The inferior turbinated body is of a vivid red; the septum is also distinctly red, but of not so strong a hue, while the middle turbinated body is of a still paler tint.

Posterior Rhinoscopy is to all intents and purposes the same process as laryngoscopy, except that the laryngeal mirror is turned upwards to obtain a view of the posterior nares, and is, when used for this purpose, called the *rhinal* mirror. Rhinoscopy is a more difficult process than laryngoscopy, inasmuch as more causes of failure, due to natural conformation of the parts, enter into consideration, and prevent a satisfactory rhinoscopic image from being obtained. Of these the following are the principal:

α. The arching up of the dorsum of the tongue.

β. Irritability of pillars of fauces, and of posterior wall of the pharynx.

γ. Enlarged tonsils and uvula.

δ. Insufficient distance between the uvula and posterior wall of the pharynx.

In laryngoscopic examination, as has been pointed out, it is not necessary to touch the pharynx or fauces, but in using the rhinal mirror it is often impossible to avoid doing so. The third difficulty is the greatest, and to overcome it many instruments have been suggested to draw the uvula forward, and so to increase the area open to inspection; but they have not commended themselves to me, and are never employed either by my

colleagues or myself. As a matter of experience, I have long come to the conclusion that, while ease and completeness of post-rhinal examination depend almost entirely on the amount of space at command between uvula and post-pharyngeal wall, so also does this condition favour disease in the region under considera-

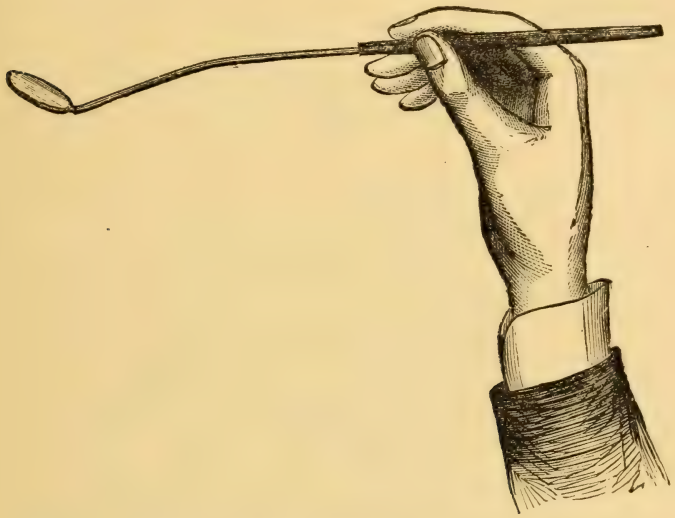


FIG. LI.—CURVE OF SHANK OF MIRROR, AND POSITION OF HAND NECESSARY FOR RHINOSCOPY.

tion—that is to say, the wider the distance between soft palate and pharynx, the more surely one may expect, on examination, to find post-nasal trouble. This little fact is one of some consolation where a rhinoscopic examination is unsatisfactory on account of the contrary relation of these parts.

The steps necessary to take in making a rhinoscopic inspection

FIG. LII.—FRÄNKEL'S RHINOSCOPIC MIRROR (ONE-THIRD MEASUREMENTS).

are exactly the same as for the laryngoscopic up to No. 6 (see page 47); but the mirror used must be of the smallest size in Fig. XXIV., and should be curved so as to take the shape of the floor of the mouth (Fig. LI.) My own examinations have always been made with the small-sized laryngeal mirror suitably curved,

as shown in this illustration. The instrument known as Fränkel's (Fig. LII.), by means of a sliding lever enables the surgeon to vary the angle of the mirror by a simple movement of his thumb. Though in general use by many surgeons, it has not been found necessary for employment in ordinary examinations in my own practice; but it will be found convenient in those cases in which the space between the soft palate and back of the pharynx is unusually narrow.

As in inspection of the fauces, so also in rhinoscopy, some form of tongue-depressor is often indispensable; and although Stoerck

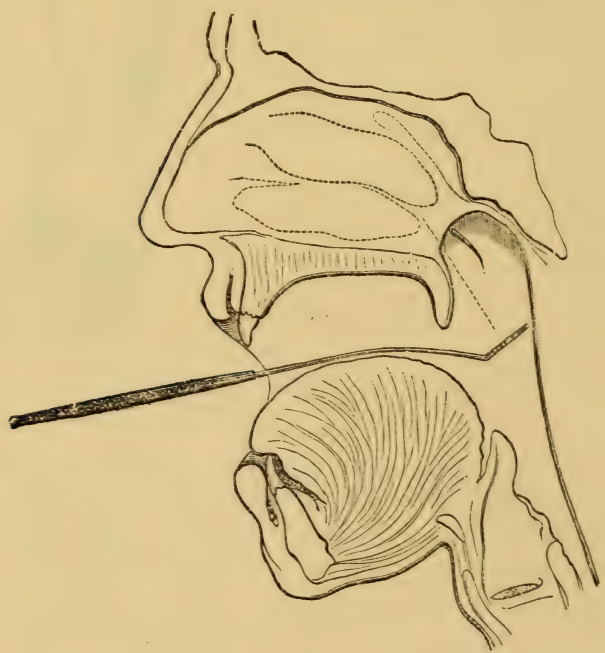


FIG. LIII.—SECTION SHOWING POSITION OF MIRROR AND PATIENT'S HEAD FOR OBTAINING A RHINOSCOPIC IMAGE.

and Voltolini have both devised an instrument which combines in itself mirror and depressor, they have acknowledged that nothing is gained by such an arrangement, except that it leaves one hand of the examiner free; while it possesses the decided disadvantage of limiting the movements of the mirror so essential to successful rhinoscopic observations. For this purpose I prefer the Fränkel depressor or finger-extension spatula already described (Figs. XXVIII. and XXIX.).

As before stated, the patient is placed as for laryngoscopic

examination, except that the head is inclined slightly forward instead of backward. This procedure is important for two reasons ; first, because it brings the more anterior portions of the nares in a direct line with the reflected light ; and, secondly, because such a position allows the pendulous portion of the soft palate to fall away from the posterior wall of the pharynx. Carl Michel, of Cologne, also advises that before opening the mouth the patient should place it in the position of a broad grin, as in this situation the soft palate is more pendulous. Experience justifies me in endorsing this recommendation. The tongue, unless under control of the patient, is now depressed gently but firmly, care being taken not to use more force than is necessary. The mirror is introduced with especial care not to touch either tongue, palate, or wall of the pharynx (this is not difficult), the body of the mirror being sidled beneath the arch of the palate, and then turned into proper position, with its face looking upwards and forwards, by placing its handle parallel with the long axis of the tongue. The tendency of the velum to contract and cut off the light from the mirror is best counteracted by directing the patient to breathe slowly through the nose, and at intervals to emit a long-drawn groan, both of which proceedings cause the whole to relax and remain flaccid.

There are, nevertheless, cases where, from various causes, the distance between the soft palate and the posterior wall of the pharynx is too small to admit of ordinary rhinoscopy, and possibly also some in which it is desirable to have increased space for the removal of growths, etc. In such contingency the following measure has been recommended. With a Bellocq's canula, pass a strip of small-sized soft rubber tubing (such as is used for drainage in small wounds) through the inferior nasal passages, and drawing their ends through the mouth, tie them to the portion left projecting from the nostrils. By this means the velum palati is folded upon and held close in contact with the roof of the mouth, and cannot interfere with the reflection of light into the posterior nares. This proceeding is said to be only at first attended with a few spasms of sneezing and retching, which, however, soon pass off, and the bands may then be left *in situ* for ten or fifteen minutes without occasioning pain or excessive discomfort. I have, however, rarely found it difficult to obtain a rhinoscopic image without recourse to such measures, and when an operation is to be performed I am content to take as a guide for the instrument the knowledge acquired from previous examinations. In this objection to extraneous instrumental

aids of complicated character I am happy to find myself in accord with Schech.

With a view of lessening the sensitiveness of the parts, I have lately, in common with most other practitioners, been in the habit of applying to the velum and fauces a five or ten per cent. solution of hydrochlorate of cocaine. This subdues the reflex excitability of the mucous membrane, and diminishes the discomfort attending these kinds of manipulations.

Digital Examination of the posterior nostrils is of the highest value, and should never be neglected in the case of children, as it often affords most valuable information, especially when the result of a visual inspection has been unsatisfactory. It is, however, necessary for this purpose that the observer should thoroughly know the relative normal position and sensation to touch of the parts. The procedure should, of course, only be resorted to after the mirror examination, which would otherwise be rendered impossible; and one of the finger-guards already described (p. 57) is desirable. The process is disagreeable rather than painful; it is sometimes followed by more or less hæmorrhage, which is not, however, of importance.

Preliminary to making the examination, especially in children, the head, with the exception of the face, should be enveloped in a large towel, the two ends of which may be made to meet, and if held firmly by a nurse or assistant, restrain movement of the arms as effectively as would a straight jacket. The surgeon should then place the head so covered under his left arm, steadying it with the corresponding hand, one finger of which presses in the patient's cheek so as to act as a gag; then deftly introducing the right index-finger as far back in the throat as the posterior pharyngeal wall, he should turn it upwards behind the uvula. Spasm is soon overcome, and then, *with the septum as a guide,* the whole of the space between the Eustachian opening and the vault of the pharynx can be explored. It should be smooth and free from prominences. The inferior surfaces of the turbinated bodies can also be examined in this way for evidences of the presence of hypertrophies and new growths. Care should be taken not to mistake the cartilaginous lip of the Eustachian orifice (Fig. LIV., 15) for a morbid induration.

Some writers on this subject recommend the use of a nasal probe in order to determine the mobility, etc., of the parts brought into view, but this practice cannot be recommended for general adoption any more than the use of a similar instrument in the larynx, unless the membrane has been previously anæsthetized,

since the irritation and (it may be) hæmorrhage so caused is apt to set up reflex movements which materially impede and sometimes altogether prevent any further examination. To obtain local insensibility I employ small pledgets of cotton-wool soaked in a 20 per cent. solution of cocaine, which, being placed in the nostril, are left there for at least fifteen minutes. The nasal probe, although to be used with caution, is of great value in determining consistence and attachments of new growths, the existence of necrosis, presence of foreign bodies, etc.

The Posterior Rhinoscopic Image (Figs. LIV. and LV., and also Fig. 38, PLATE V., at end of the book).—A view of the post-nasal passages is not only more difficult to obtain, but is less easy

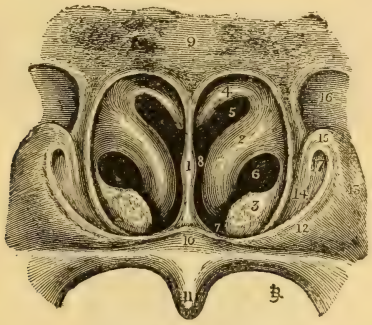


FIG. LIV.—THE POSTERIOR RHINOSCOPIC IMAGE.

1. Septum.
2. Middle turbinated bone.
3. Inferior turbinated bone.
4. Superior turbinated bone.
5. Superior meatus.
6. Middle meatus.
7. Inferior meatus.
8. Main passage of nostrils.
9. Vault of pharynx and pharyngeal tonsil.
10. Cushion of soft palate.
11. Posterior surface of uvula.
12. Ridge formed by levator palati.
13. Salpingo-pharyngeal fold.
14. Salpingo-palatine fold.
15. Eustachian prominence or cushion.
16. Fossa of Rosemüller.
17. Eustachian orifice.

for the beginner to realize in detail, since the small amount visible in the mirror at first sight, and the different angles at which the mirror must be turned, may sometimes create a difficulty in identifying what is seen. It becomes necessary, therefore, to shift the mirror, and only practice will enable the observer to compare the various views, so as to form an accurate judgment of the condition of the entire cavity. For these reasons the depicted image must always be of composite character. Comparison of the rhinoscopic image in Fig. LIV. with that of the posterior nares, as seen on dissection in Fig. LV., will greatly facilitate appreciation of the various structures and of their situations.

The septum (1) divides the posterior nares into two symmetrical halves, and this line is a useful guide to the relative positions of the various parts. It is thin and pale in colour, the mucous membrane being firmly attached, and showing the bone underneath. The posterior nares, two oval spaces, bounded by the vomer or septum on one side, and the external wall of the nostril on the other, will now be observed, and in their respective positions the middle (2), the inferior (3), and the superior (4) turbinated bones, the first-named being that which is most seen, the other

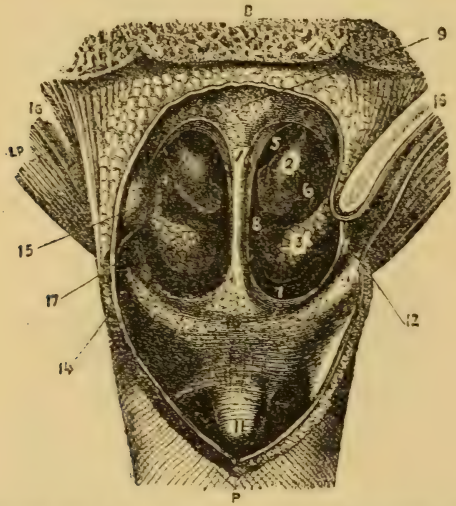


FIG. LV.—VIEW OF THE POSTERIOR NARES, THE PHARYNX BEING LAID OPEN FROM BEHIND (AFTER LUSCHKA).

B. Basilar process.
P. Pharynx.
1. Septum.
2. Middle turbinated bone.
3. Inferior turbinated bone.
4. Superior turbinated bone.
5. Superior meatus.
6. Middle meatus.
7. Inferior meatus.
8. Main passage of nostrils.
9. Vault of the pharynx and Luschka's tonsil.
10. Cushion of the soft palate.
11. Posterior surface of uvula.
12. Ridge formed by levator palati (L. P.).
13. Salpingo-pharyngeal fold.
14. Salpingo-palatine fold.
15. Eustachian prominence or cushion.
16. Eustachian tube, closed on the left and laid open on the right side.
17. Eustachian orifice.

two being only partially visible. There may be considerable divergence in symmetry in these structures, which is not always due to abnormality. Between the various spongy bones may be seen the three meatus—superior (5), middle (6), and inferior (7)—and the space between the inner boundary and the free edge of the septum is the open passage of the nostrils (8). At the upper part of the image, above the vomer and the boundary of the nasal orifice, can be seen the vault of the pharynx (9), with the masses of adenoid tissue constituting the pharyngeal tonsils

of Santorini and Luschka. The lower boundary of the posterior, and a portion of the inferior, turbinated bone is cut off from view by the posterior wall of the velum (10), which, as well as the posterior surface of the uvula (11), is seen at a still lower level, the colour of these parts being a florid red. At the lower portion, and external to the nasal fossa, slightly below the level of the middle meatus (12), is seen a cup-like depression of oval shape, and with elevated ridges: this is the orifice of the Eustachian tube (17). The inner ridge is formed by the salpingo-palatine fold (14), the outer by the salpingo-pharyngeal fold (13); while below is seen the elevation formed by the levator palati muscle. The upper margin of the Eustachian tube, as seen in the mirror (in reality the posterior border), is formed by its posterior cartilaginous wall, which is very prominent: it is known as the Eustachian cushion (15), and it forms the anterior boundary of the fossa of Rosemüller (16). This last-named depression lies above and externally in the image, posteriorly, in fact, to the tube itself. It is of clinical importance as being very commonly mistaken for the tubal opening itself by those unaccustomed to pass the Eustachian catheter.

The mucous membrane of the naso-pharynx is, in the normal state, generally of brighter hue than that of the lower pharynx—an important point to remember in practice. The septum and Eustachian orifices are pale, and the turbinated bodies of a pinkish-grey. The lower turbinated bone is paler in tint than the others, and of more uneven, sponge-like surface—a detail which has been overlooked in most coloured illustrations, and is unfortunately not well represented in my own. The wood-engraving which I have re-drawn for this edition is in this and most respects a more faithful representation. The roof of the pharynx is redder than the other contents of the nasal passages just described, and of more or less uneven surface, owing to the presence of the adenoid tissue already mentioned. The pharyngeal bursa of Luschka, which has been invested with so much importance by Tornwaldt (Chapter XXIV.), can sometimes be recognised, on the posterior wall, by the presence of mucus at its orifice. Its situation and indeed its existence are both variable.

CHAPTER VI.

THE GENERAL SEMEIOLOGY OF THROAT DISEASES.

In taking a case of throat disease, after the usual questions of identity, predisposing and exciting causes, it will be well, in order to simplify matters, to classify the symptoms under the following headings :

(A) Functional or Subjective, including impairment of the functions of voice, respiration, deglutition, and, in many pharyngeal and nasal diseases, of the special senses of hearing, smell, and taste; the phenomena of cough, and the amount and character of expectoration and of mucous and salivary secretion. Pain, irrespective of exercise of function, and nervous phenomena, such as that known by the term *globus hystericus*, may be also considered under this heading.

(B) Physical or Objective, embracing all the appearances viewed by the observer, within the mouth and the passages of the throat and larynx, special reference being given to alterations in colour, form, position, and mobility.

(C) Miscellaneous and Commemorative, which include those presented on external examination, as well as those which affect the constitution generally. Here may also be included examination of the chest, of the auditory apparatus, and of the nasal passages.

The following tabulated list of symptoms will, it is thought, facilitate reference in future; each of the various classes of symptoms can then be considered in detail. The arrangement is that which I devised for use at the Central Throat and Ear Hospital for the taking of cases requiring detailed notes. An abridged form is employed for those of less interest, and the various appearances on visual inspection are noticed as occasion may require on one of the outline forms (Fig. LVI.), which were first introduced at that institution, and are kept in books with adhesive backs for application to the case papers.

[Books of these forms, for taking either throat or aural cases, are published by Messrs. Baillière, Tindall, and Cox.]

A. FUNCTIONAL OR SUBJECTIVE SYMPTOMS:

1. **Voice** may be
   - Modified in tone, power, and endurance.
   - Hoarse, husky, thick, guttural or nasal.
   - Aphonic, or polyphonic.
   - Jerky.
   - Shrill, or squeaky.
   - Attended with pain or fatigue (mogiphonia or odyphonia).

(**Articulation** may be impaired irrespective of phonetic quality.)

2. **Respiration** may be embarrassed
   - Slightly, on exertion.
   - Continuously.
   - Spasmodically.

   May be painful. Embarrassment may be laryngeal or pulmonary.

Note—and if necessary test with Spirometer—vital capacity, and observe whether respiratory act is full and abdominal, lateral or costal, or exaggerated to clavicular elevation.

3. **Cough** may be
   - Irritable.
   - Hacking.
   - Painful.
   - Paroxysmal.
   - Continuous.

   On rising. After exertion. After meals. On change of temperature.

   With or without expectoration or hæmorrhage.

   Its phonetic character may vary and be
   - Hoarse.
   - Barking.
   - Metallic.
   - Stridulous.
   - Aphonic.

4. **Deglutition** may be
   - Difficult (*Dysphagia*).
   - Painful (*Odynphagia*).
   - Impossible (*Aphagia*).

   Varying with consistence and temperature of food.

NASAL SYMPTOMS:—

5. **Nasal respiration** may be impaired, or altogether obstructed, in one or both nostrils.

N.B.—Dryness of throat and mouth on rising is an almost invariable symptom of mouth-breathing due to nasal stenosis. Inquire as to snoring. Examine odour of air expired through the nose.

6. **Senses** of **smell** and of **taste** may be
   - Impaired, or Absent, or Abnormal.

   Temporarily. Permanently.

AURAL SYMPTOMS:

7. **Hearing** may be (in pharyngeal and nasal disease only)
   - Impaired.
   - Abnormally acute.
   - Painful.

   Temporarily. Permanently.

Note facts concerning aural discharges, vertigo and tinnitus.

[For further details of aural symptoms see 'Special Aural Forms,' and chapter on 'Throat Deafness.']

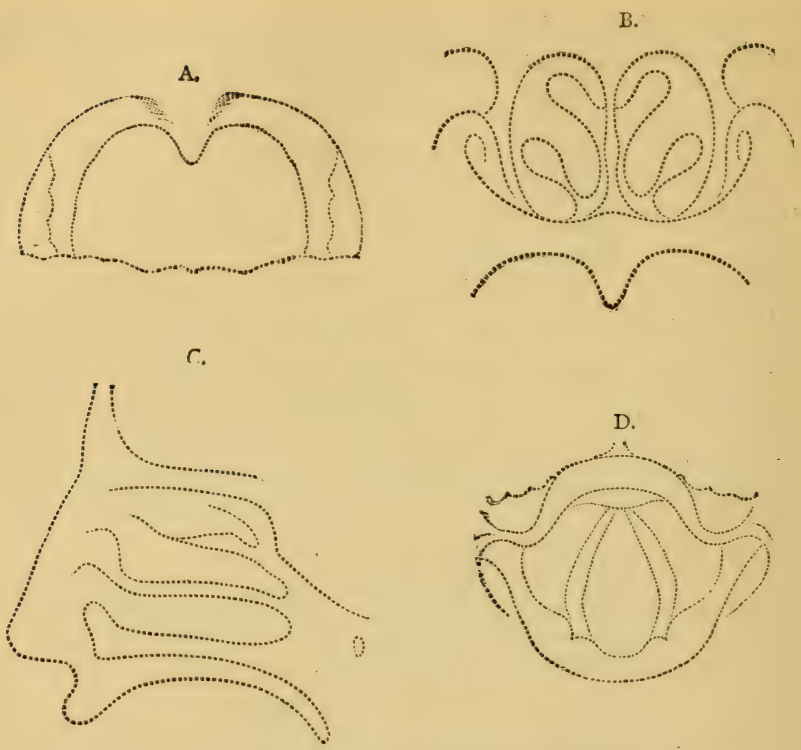


FIG. LVI.—OUTLINES OF (A) FAUCES, (B) POSTERIOR NARES, (C) SECTION OF NARES, AND (D) LARYNX, FOR NOTE-TAKING.

8. **Pain** or **altered sensation** may be experienced in exercise of any of the above functions, or may be irrespective of them, and may then be occasional or persistent.

B. PHYSICAL OR OBJECTIVE — LARYNX, FAUCES, PHARYNX AND NOSE.

1. **Colour** may be { Increased (*Hyperæmia*). / Diminished (*Anæmia* or *Hypo-æmia*). / Altered. } Uniformly or Partially.

2. **Form, texture,** and **mobility** may be altered by { Swelling—Œdematous infiltration—Thickening—Submucous deposit. Bony and cartilaginous hypertrophy. / Loss of tissue—Ulceration. / Cicatricial narrowing. / Compression. / Paralysis, bi- or uni-lateral. / New formations. }

3. **Position** (relative) may be altered by disease. { Intrinsic. / Extrinsic. }

4. **Secretion** may be { Excessive. / Deficient. / Arrested. } Altered in colour, consistence, and odour.

C. Miscellaneous:

External:

General { Circulation. | Lymphatic glands.
Temperature. | Digestion.
Respiration. | Nutrition.
etc., etc.

Commemorative { Individual and family history of previous attacks, heredity, etc.

A. FUNCTIONAL OR SUBJECTIVE SYMPTOMS.

1. The **Voice** may be natural in speaking, and modified only in singing, the upper or lower notes being lost, but the ordinary speaking voice being unaffected; or difficulty may be experienced in passing from or to one or other register of the singing voice. The sustaining power of either the singing or speaking voice may be diminished, the vocal organ becoming more or less quickly fatigued. [It is often well to test the voice by the piano, marking on what notes or in what register the voice fails.] The voice may be continuously hoarse, or may be uncertain, *i.e.*, sometimes natural or only slightly husky, at other times passing involuntarily into falsetto or into deep bass. It may be muffled or veiled. It may be unusually shrill or jerky. It may be strained and difficult. It may be lost in speaking, though in involuntary vocal acts, such as coughing and laughing, it may be phonetic; and, lastly, it may be entirely lost, and constitute the condition known as aphonia.

[In *The Nomenclature of Diseases*, drawn up by the Royal College of Physicians, 'Aphonia' is entered as a disease; and, unfortunately, this error has been perpetuated, not only in some systematic treatises on medicine, but even in special works on affections of the throat.]

In pharyngeal and naso-pharyngeal affections, the phonetic quality of the voice will, *cæteris paribus*, not be impaired, though, articulation being interfered with, it will often sound thick or muffled, or it will be quite altered in tone, acquiring a nasal character. In this case it will be deficient in nasal *resonance*, or affected by a nasal '*twang*.'

Speech may be painful; it may be defective in the pronunciation of only certain consonants, as the palatal or guttural, the labial or the nasal; and it is of course important to determine whether such defects of speech or articulation depend on central or peripheral nerve changes, or on mechanical obstruction to proper muscular movements and of cavities of resonance.

2. **Respiration** may be altered; the respiratory movement being increased or decreased, hurried or retarded. The difficulty of breathing may be continuous, or the attacks of dyspnœa may be only paroxysmal. The breathing may be stertorous, or stridulous; in-spiration may be difficult, indicating as a rule laryngeal obstruc-

tion; and ex-spiration generally easy, or *vice-versâ*, or both in-spiratory and ex-spiratory acts may be impeded: there may be complete orthopnœa—difficulty in ex-spiration generally implies obstruction in the bronchi. It is most necessary to note whether the respiratory embarrassment be due to laryngeal or pulmonary causes. The act may be accompanied by working of the alæ nasi, and numerous observations go to show that this symptom may be the precursor of serious laryngeal dyspnœa. On the other hand, in cases of nasal stenosis there is often a conspicuous immobility of the nostrils, producing the type of facial expression known as the 'Adenoid.'

Independently of disease, the breathing may be deeper or shallower than the normal. So many affections of the voice are the result of imperfections in the respiratory act, that a careful examination as to the mode in which the patient fills his chest, and of his vital capacity as ascertained by the spirometer, will often afford a valuable indication for diagnosis. Briefly, the general defects under this head are as follow: I. Imperfect chest expansion, the act being confined to lateral expansion of the ribs without putting into exercise the diaphragm, descent of which is necessary for full deep breathing. II. Exaggerated expansion by elevation of the clavicles and scapulæ. III. Imperfect control of the ex-spiratory act, the air being emitted either before the vocal cords are made ready to vibrate, or in undue amount for the performance of the vocal act.

Hæmoptysis rarely occurs except when the lungs are affected in phthisis, or in cancer of the larynx or pharynx. Streaks of blood are occasionally observed in the expectoration accompanying some minor diseases of both pharynx and larynx. A sensation to taste, and sometimes the actual presence of blood in the mouth on rising from sleep, is characteristic of varix of the tongue and mouth, of the pharynx, and possibly of the œsophagus—the last a condition to which attention has recently been drawn by Zeuker, Rokitansky, and others. I have also known it occur in connection with undue vascularity of the inferior turbinated bone, without epistaxis.

3. **Cough.**—This may amount to slight irritable hacking or 'hemming,' or it may have all the characters of true cough. Its phonetic quality may vary: thus it may be hoarse, barking, or metallic, stridulous or aphonic. It may be accompanied by pain, may occur only on rising in the morning, on exertion, on lying down, after meals, on change of temperature, or after walking; or it may be frequent and continuous. It may be short, sharp,

and paroxysmal, or suffocative; and, lastly, it may occasion retching and even vomiting.

Stoerk, in a pamphlet published in Vienna in 1878, has drawn attention to the fact that there are certain 'cough-spots;' namely, the inter-arytenoid fold, the posterior wall of the larynx and trachea, the under surface of the vocal cords, and the bifurcation of the trachea. He does not consider accumulation of mucus in the smaller bronchi causative of cough until it reaches one of the points above mentioned. Careful examination of these suggestions has convinced the author of the accuracy of Stoerk's observations; and it need hardly be said that they are of the highest diagnostic importance. It may be added, however, that the cause of cough by reflex irritation is hardly explained by the learned Viennese professor. Probably he would consider it as belonging to a separate category.

When the larynx only is affected, the cough, unless there be ulceration, is accompanied by but little secretion, the mucus being expelled in small gelatinous pellets, more or less discoloured by impurities of atmosphere. Expectoration may be either free and mucous, as in chronic congestion; muco-purulent after acute inflammation; purulent, as in the bursting of abscesses; frothy, as in phthisis and carcinoma; clear and glairy, as in stenosis; and accompanied by blood in some cases, in which there is loss of tissue.

In malignant disease, and whenever there is caries or necrosis, the expectoration will be of fœtid odour, and may contain blood pigment.

In laryngorrhœa, and in blenorrhœa, a disease described at some length by Stoerk as peculiar to certain inhabitants of Bessarabia and Galicia, the secretion is excessive.

4. **Deglutition.**—This may be painful (*odynphagia*), difficult (*dysphagia*), or impossible (*aphagia*).

In considering the relative importance of this symptom, it is necessary to find out in which act of deglutition difficulty or pain occurs—whether, 1, in propulsion of the bolus behind the anterior pillars, as in acute quinsy; 2, in the closure of the naso-pharyngeal space, and elevation of the root of the tongue, which act sends the morsel into the middle of the pharynx, as seen after diphtheria and in syphilis; 3, in the passage of the food from the pharynx into the œsophagus, as in tuberculosis; or, 4, in the œsophagus itself, as in stricture of that region.

The cause of the *dysphagia* may be either a paresis of constrictors so often witnessed in patients with defective teeth; to an obstruction in the passages of the fauces, the pharynx, or œsophagus; or an intrinsic nervo-muscular disorder of one or more of those parts; or it may be due to thickening and ulceration, either of the velum, pharynx, or epiglottis; in which case the food

either returns through the nares or passes into the larynx. It may also be due to extraneous causes; viz., mediastinal tumours, aneurisms, and enlarged bronchial glands, or to carcinomatous deposits in the sheath of the œsophagus. Occasionally dysphagia is caused by ulceration, or new formations in the neighbourhood of the inter-arytenoid folds, or by the pressure of an external tumour, as a goitre, or other disease of the thyroid gland. Dysphagia may be modified according to the nature of the food taken, whether solid or fluid, warm or cold, piquant or bland, and may be paroxysmal and spasmodic, or continuous.

Odynphagia is characteristic not only of tonsillar difficulty, but also of tuberculous or malignant ulceration of the epiglottis. On the other hand, in syphilitic ulceration and thickening, pain in swallowing is neither a prominent nor even a usual symptom; and in lupus, a disease of the throat which is by no means so rare as has been generally supposed, absence of pain is even more marked than in syphilis, and serves to differentiate it from tubercle.

Aphagia rarely occurs, except in very advanced stages of pharyngo-laryngeal disease, or as the result of malignant obstruction of some portion of the swallowing tract. Cough following deglutition may imply regurgitation of fluid into the larynx, from imperfect action of the epiglottis, or may be an indication of a fistulous communication between the trachea and gullet.

5. **Nasal Respiration** is often obstructed in certain pharyngeal diseases, and from the presence of new growths, and hypertrophies in the naso-pharyngeal and nasal cavities. No examination of the throat is complete without careful inspection of the nasal passages through both the anterior and posterior nares, and also where symptoms point to disease of the naso-pharynx, by means of the index-finger introduced upwards behind the velum: these are points still much neglected both in precept and practice. Impediment to freedom of nasal respiration is easily ascertained by directing the patient to exhale by each nostril, the opposite one and the mouth being firmly closed. The distinction between the current and note of the expired breath, in the case of diminution of normal calibre, between a hypertrophy or a polypus, is very marked, and, although difficult to describe, is, after a little practice, not difficult of discernment.

In certain pharyngeal diseases also there is a disagreeable odour in the ex-spired breath, and it is important to ascertain the point of origin of the stench. In many instances, neither ocular nor digital examination will suffice, and the observer's olfactory sense must be called to assistance. If the patient, firmly closing his

nostrils, forcibly exhales, and the ex-spired breath is offensive, the cause is situated either in the larynx or œsophagus, pharynx of tonsils, or it may be caused by decaying teeth, or by gastric derangement. If, on the other hand, with mouth firmly closed, nasal ex-spiration gives a foul odour, the disease is in the nasal cavity itself. By closing first one and then the other nostril, the surgeon may still further localize the seat of the disease. Another most valuable diagnostic point is whether the patient is conscious of the offensiveness of his breath. If so, the cause is an obstruction from presence of polypus, or other growth. If not, the disease is of secreting surface. By washing out the nostril with some disinfecting solution, as Sanitas, Condy's fluid, or boracic acid solution, it is not difficult to determine whether this foul odour be due to morbid alteration or retention and consequent putrefaction of mucous secretion, or whether it be the result of necrosis or caries. In the latter case the stench is seldom entirely removed, and is of a much more penetrating character.

6. **The sense of smell** may be impaired from any of the causes likely to impede nasal respiration, from disorder of mucous secretion, and from many diseases extending from the pharynx to the naso-pharynx. In the case of loss of this sense due to nasal polypus, the growth is to be looked for in the superior passages. The author has seen two cases of complete anosmia cured by removal of an elongated uvula.

The sense of taste is generally disordered where that of smell is impaired. It will be probably limited, in the class of diseases treated in these pages, to inability to distinguish flavour of food and bouquet of wine—that is, to so much of the sense as is dependent on the olfactory nerve; impressions on the palate due to the temperature and piquancy of food being unchanged.

7. **Hearing** is impaired in relation to enlarged tonsils by interference of the enlarged glands with the action of the palate and its muscles, to thickening of the pharyngeal orifice of the tubes, or to disease of mucous secretion of the naso-pharynx, or to extension of any catarrhal inflammation from this region to the middle ear. To be thoroughly acquainted with the study of throat diseases it is necessary to acquire facility in examining the auditory apparatus, and to be able to recognise the importance of at least the more common variations in the appearances of the drumhead, the value of tests by watch and tuning-fork, and how to pass a Eustachian catheter, or to use a Politzer air-bag. It is difficult to comprehend how an aurist can work satisfactorily without having studied the physiology and pathology of the throat and nose, or how one who occupies himself with diseases in the latter

region can fail sometimes to be at a loss, unless he has worked also at aural surgery. It would be beyond the scope of this work to make it exhaustive of all aural diseases in relation to the throat; but I have appended a chapter suggestive of their study, and also tolerably extended directions as to how to examine an aural case.

8. **Pain** is an important element of diagnosis, which will be considered when dealing in detail with the various diseases in which it occurs. Almost all reflex nervous pains and sensations may be traced to objective sources, and should not be treated, as is too frequently the case, as entities. Amongst the commonest disturbances of ordinary sensation are dryness, the presence of a foreign body in the throat, a hair, gravel, or a lump; or a feeling of heat, tingling, weight, or nausea. All these may be associated with fatigue in the performance of functional acts, which may also occur independently.

B. PHYSICAL OR OBJECTIVE SYMPTOMS.

Those deviations from the normal condition which are revealed to the observer by reflected light will be more especially considered under this heading.

1. **Colour** of the parts may be increased, diminished, or altered. It may be increased or hyperæmic in acute, subacute, or chronic inflammation; it will be diminished or anæmic in general anæmia, and in certain toxic affections; changed to a bluish tinge in cyanosis; yellowish or greenish in jaundice; grey as in the earlier stages of phthisis, and altered in œdematous, purulent, and tuberculous infiltration. The colour of new formations varies of course with their pathological nature, ranging from white or pale grey to deep red or purple.

The change of colour may be general or partial; thus one vocal cord may be congested, the other normal; the epiglottis may be congested, and the arytenoids healthy, or *vice versâ*. The colour may be altered in patches, as in the congestion of the vocal cords of secondary syphilis. The colour of ulcerations varies also according to their nature. It must not be forgotten that the cartilaginous part of the vocal cords, especially in the case of those who constantly use the voice, is often slightly pink in colour, and this appearance must not be mistaken for the result of disease.

2. **Form.**—The calibre of the glottis is seldom increased, as, even if there is loss of tissue by ulceration, there is generally attendant thickening. The calibre may be diminished by all causes tending to infiltration, serous, purulent, tubercular, syphi-

litic, or malignant; by new formations, and by paralysis of one or more intrinsic muscles. As a result of this last cause, the **mobility** of the vocal cords, *i.e.* their power of lateral approximation and separation, may be impeded, or tension may be impaired on one or both sides. Such paralysis may arise from pressure directly on the nerve-supply, from central or peripheral disease, from interstitial disease of muscles, or from mechanical causes.

Impairment of movement of the epiglottis is due to mechanical causes, to relaxation of the glosso-epiglottic ligaments, or, it may be, to disease of the superior laryngeal nerve. The **texture** or surface-appearance will be changed under the varying conditions of the inflammatory process above alluded to.

3. **Position.**—Certain portions of the larynx may be displaced, which might be considered by some as constituting only an alteration in form, or the whole organ may be pushed more or less out of position. Partial displacement is generally due to intrinsic disease, especially syphilitic, while displacement of the entire larynx is the result of disease in the neighbouring structures, as cancer, abscesses, bronchocele, and other glandular affections.

4. **Secretion** may be excessive, defective, or altered.

The character of the secretion of the salivary and other glands is an important element of diagnosis, and is to be considered independently of the question of the nature of sputa.

C. MISCELLANEOUS AND COMMEMORATIVE SYMPTOMS.

Into these it is unnecessary to enter at any length. The state of the tongue, the pulse, the temperature, the appetite and nutrition, the action of the liver, kidneys, and uterus, are all of as much importance in laryngeal disease as in any other. This point is one to be remembered, as in many cases the special method of examination seems to tell us so much that we feel inclined to make a diagnosis of the malady without asking a question of the patient. On the other hand, it will not unfrequently occur that only by such general examination can a cause be found for a disease believed by the patient to be purely local, and in such a case the laryngoscope will be of value in a negative, but none the less practical sense.

As regards the use of the laryngeal probe, so far from being, as some authors insist, an instrument of the first importance, it is one that it is very rarely necessary to employ. Pretty well everything that is necessary to be known can be ascertained by visual inspection. It is, however, of service to the surgeon who, not being very familiar with the introduction of instruments into the

larynx, would wish to learn before operating the exact direction that his instrument should take for the accurate cauterization of ulcers or the removal of new growths.

In external examinations it is important to examine the glands in the suboccipital region for corroboration of syphilis, and those in the parotid and submaxillary region for evidence of suspected malignant or strumous disease. Much may be learned by external examination of the larynx itself. There may be redness and swelling, as in perichondrial disease. It may be seen to be pushed out of the median line; or, as in the cases of cancer and syphilitic infiltration, its mobility will be felt to be impeded. There may also be an expansion of the larynx either symmetrical or unilateral. **Stethoscopic examination** will also be necessary to ascertain the condition of the lungs in cases of chronic laryngitis, or wherever there seems reason to suspect the presence of tubercle. Such examinations should be carefully repeated from time to time. The general utility of auscultation of the larynx or trachea is doubtful, though it is certainly of some diagnostic value in some affections of the œsophagus.

Careful examination of the heart and large vessels, and of the mediastinum for enlarged glands, or other intra-thoracic growths, is all-important where there is the least interference with mobility or co-ordinative action of the vocal cords. The **sphygmograph** and **ophthalmoscope** also frequently aid the observer in a most important degree to the obtaining of an accurate diagnosis. An interesting example of the indication afforded by the **pulse** may be seen in its depression almost even to obliteration which takes place during the act of inspiration in cases of laryngeal obstruction, such as croup.

The **history** of the patient, both personal and family, will greatly assist in forming a correct prognosis, and in laying down sound bases for treatment.

Information of the greatest value, both in diagnosis and in prognosis, is to be obtained from observations of the **weight** at regular intervals of the patient, as, for instance, in distinguishing between syphilis and cancer, and in cases of chronic laryngitis, with premonitory signs of phthisis. It is equally essential, in such circumstances, to ascertain whether there are any nocturnal exacerbations of **temperature.**

As already indicated, there is a certain class of cases where when positive symptoms are absent, the **Spirometer** is of value as indicating deficiency, and possibly, under treatment, increase of lung capacity.

The following table, taken from *Voice, Song, and Speech*, will be found of service, as affording data for comparison on this and other desirable details of information:

TABLE SHOWING THE AVERAGE HEIGHT, WEIGHT, BREATHING CAPACITY, AND CHEST-GIRTH OF ADULT MALES AND FEMALES IN ENGLAND.

DRAWN UP FOR THE AUTHORS OF 'VOICE, SONG, AND SPEECH,' BY CHARLES ROBERTS, ESQ., F.R.C.S.,

FROM DATA COLLECTED BY THE ANTHROPOMETRIC COMMITTEE OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

MALES.				FEMALES.		
CHEST GIRTH, AFTER EXPIRATION.*	WEIGHT, INCLUDING CLOTHES. †	BREATHING CAPACITY. ‡	HEIGHT, WITHOUT SHOES.	BREATHING CAPACITY. ‡	WEIGHT, INCLUDING CLOTHES. †	CHEST GIRTH BELOW BREASTS.
Inches.	Lb.	Cubic inches.	Inches.	Cubic inches.	Lb.	Inches.
38·9	165·6	290	72	238	141·1	32·7
38·4	163·3	280	71	230	139·1	32·2
37·8	161·0	270	70	221	137·2	31·7
37·3	158·7	260	69	213	135·2	31·2
36·7	156·4	250	68	204	133·3	30·8
36·2	154·1	240	67	196	131·3	30·4
35·7	151·8	230	66	187	129·4	30·0
35·1	149·5	220	65	179	127·4	29·5
34·6	147·2	210	64	170	125·4	29·0
34·0	144·9	200	63	162	123·5	28·5
33·5	142·6	190	62	153	121·5	28·1
33·0	140·3	180	61	145	119·6	27·6
32·4	138·0	170	60	136	117·6	27·2
31·9	135·7	160	59	128	115·6	26·6
31·3	133·4	150	58	119	113·7	26·1

* Military measurement: Tape round chest at nipples, arms hanging loosely by the side. Let the patient count from one to ten, then read off the measurement.

† The average weight of indoor clothes, including the shoes, is, for the

professional class	8 lb.
Average for working-class	10 lb.
Average for men	9 lb.

The average weight of a woman's dress has not been accurately ascertained, but it is among female shop-assistants and school teachers about 7 lb. We are very much in want of information as to the weight of ladies' dresses; the average is probably nearly equal to, or even in excess of, that of the male working-class.

‡ Breathing capacity of males: Hutchinson's table, published in 1846, gives a difference of only 8 cubic inches for each inch of height. The above table gives a difference of 10 inches for each inch of height, and a relative increase of upwards of 20 cubic inches as compared with Hutchinson. These differences are very probably the result of the accuracy of the instruments now employed.

Breathing capacity of females gives in this table an average decrease of power, as compared with males, of only 20 per cent., instead of 33 per cent., as estimated by Hutchinson. Thus, having made allowance for the relative increase granted by us for men, a female at 66 inches, who would have breathed 142 cubic inches according to the old table, is now found to have a vital capacity of 187 cubic inches.

CHAPTER VII.

THERAPEUTICS OF THROAT DISEASES: MEDICAL, SURGICAL, DIETETIC, AND HYGIENIC.

In considering the therapeutics of throat diseases, special attention will necessarily be given to those remedies and methods of treatment which have a topical action; but it must not be supposed on this account that general treatment is unnecessary in diseases of the throat; on the contrary, each year's experience the more convinces me that it is often equally futile to treat throat diseases by only topical, as it is by only general means, and with this view many formulæ for suitable constitutional remedies are appended.

Lengthened reference to general methods of treatment is not omitted, therefore, because such treatment is considered unimportant, but because, on the principle that sound general medical and surgical knowledge should precede a study of the special branches of practice, it is to be presumed that most readers of these pages will be acquainted with the principles of constitutional therapeutics.

General treatment is always specially indicated when the throat affection is symptomatic of any general malady—scrofula, phthisis, or syphilis, for example—or when it occurs in the course of a continued fever, of one of the exanthemata, of diphtheria, or as a result of zymotic influences. In other cases also a constitutional diathesis must be combated concurrently with the local trouble.

In very many local manifestations, however, general treatment is, if not contra-indicated, at least unnecessary, and in many cases of chronic laryngitis and pharyngitis the influence of local treatment will be markedly beneficial without the administration of any general remedies whatever.

In pursuing local treatment it is necessary to consider the effect of remedies on the vascular supply, on the mucous and salivary secretion, on loss of tissue, on nervo-muscular action, and on the arrest of development or the eradication of new formations. It is,

therefore, exceedingly difficult to separate medical from surgical therapeutics, and both will be considered under one chapter.

In employing topical remedies it is always well to bear in mind the physiological functions of the part to which the remedy is to be applied. For instance, the function of the larynx being to afford passage to air and not to liquids, the use of sprays to this part—at any rate, in any form except that in which the atomization is so fine as to constitute rather a cloud than a shower—is in my opinion a mistake; vapour inhalations are much more suitable and more in accordance with the natural function of the organ. The same may be said of the indiscriminate practice of blowing powders into the larynx, and of the administration of snuffs in nasal diseases. They are unphysiological, seldom beneficial, and often deleterious. On a similar principle, whenever applications of a liquid character are absolutely necessary, only a very small quantity of the liquid should be applied at a time (otherwise spasm of the glottis will be caused), and the area of application should be as far as possible limited to the exact portion affected.

Topical remedies may be divided into two classes:

1. Those which can be administered either by the patient or the practitioner.
2. Those which, requiring the management of a skilled hand, can be administered by the practitioner only.

The first class includes such remedies as gargles, lozenges, powders, inhalations, pharyngeal and nasal sprays, insufflations, douches, and pigments; and all kinds of external applications.

In the second class are contained laryngeal applications of all kinds, except those of the nature of inhalations, and all forms of operative procedure.

Class I. **Gargles.**—With respect to the value of gargles considerable difference of opinion exists, and it is an undecided point as to how far the gargle penetrates. There can, however, be little doubt that this depends to a considerable extent on the skill of the patient and the amount of practice which he has had. It would appear, from the experiments and demonstrations of M. Guinier and others, that by practice gargles may be allowed to enter the larynx itself and to come in contact with the vocal cords. This act is called by Guinier laryngeal gargling, and the following is briefly the method of use: A comparatively small amount of fluid only is taken into the mouth, which is to remain a little open. The patient should then protrude the lower jaw so as to draw away the epiglottis from the laryngeal vestibule; and

on half uttering a vowel sound the liquid drops into the larynx, and provided the patient can prevent himself from taking an inspiration, those parts above the level of the vocal cords, will be thus thoroughly laved. Experience compels me to say that laryngeal gargling is by no means an easy process.

It is probable that in the ordinary way gargles seldom, if ever, go behind the anterior pillars of the fauces. By the method of Von Troeltsch they may be made, however, to come in close contact not only with the parts touched in the ordinary mode of gargling, but also with the posterior wall and even the vault of the pharynx and the Eustachian tubes. By this method, contraction of the pharynx takes place, and powerful displacement of superficial parts; mucus is forced out of the glands, and any adherent viscid secretion is rubbed off. Von Troeltsch very justly extols the remedial gymnastic significance of systematic practice of this kind in insufficiency of the muscles of the Eustachian tube (levator and tensor palati) in cases of hypertrophy of the mucous membrane. The following are the directions to be given to such patients as are desired to employ gargles in this way: 'Take a mouthful of the gargle, hold it in the back of the throat with the head thrown back, then closing the nose with finger and thumb, open the mouth and make the movements of swallowing without letting the liquid go down the throat. No harm need be feared if some of the liquid should happen to be swallowed.'

Gargles are also of some value as mouth-washes, even if their field of action be as restricted as it generally is; and inasmuch as some patients are able to extend that action, their utility will in such cases be proportionately increased. They are generally contra-indicated when there is actual faucial pain, since more discomfort is liable to be caused by the irregular muscular acts exercised in their employment than relief experienced from the specific influence of their ingredients; this remark more especially applying to the ordinary method of gargling.

Gargles are used for their antiseptic, astringent, sedative, and stimulant properties. Formulæ of gargles having those respective actions will be found in the Appendix.

[It will be seen that many of these formulæ are almost identical with those contained in the *Throat Hospital Pharmacopœia*, in the preparation of the first edition of which I took an active part, and it has been thought better not to introduce any novelties in detail of prescribing for the sake of quasi-distinction. The list of formulæ in the Appendix is limited to such as have been tested by experience; none are omitted which have been found of distinct value.]

In the case of children, the use of gargles is usually impossible, and, as a substitute for them, it is an excellent plan to have the drug required to exercise local effect made into a powder with white sugar, or some other convenient vehicle, and placed on the tongue. If allowed to remain there and dissolve gradually, the topical effect of the remedy will be produced almost, if not quite, as well as if a gargle had been used, and the constitutional effect be enhanced. This method is of course only applicable when the remedy is one which may be swallowed with impunity, and is not of a nauseous character. As a local application, ice is of great value, not only as an anæsthetic before operation, but as a remedial agent in pharyngeal disease, tonsillitis, etc., and in the sore throat of scarlatina and diphtheria. For adults nothing is more agreeable than simple block ice, but the remedy is somewhat difficult to administer to children, who, suffering from pain in swallowing, are unwilling to exercise the function of deglutition. In these cases it will be found of great service to ice the food. A simple mixture of egg, milk, and sugar, uncooked, and iced, is taken with avidity, and is serviceable both as a nutriment and as a remedy. The Wenham Lake Ice Company make very simple and cheap refrigerators.

Lozenges.—The lozenge is a convenient form for the administration of many remedies. It should be remembered that by the use of lozenges we get not only the immediate local effect, but also the constitutional action of the drug; and this is often greater in proportion than if a corresponding amount of the remedy had been taken direct into the stomach. As examples of this may be adduced guaiacum, a comparatively small amount of which, given in the form of a lozenge, will produce constitutional symptoms; also the effervescent lozenges of Cooper (Form. 20), containing half a grain of calomel, one of which, taken at night, produces far more effect on bile secretion than two or three grains would if taken in the form of a pill. For the last two or three years I have administered the ingredients of Plummer's pill in the form of an effervescing lozenge (Form. 13), producing by this means a much quicker and more certain constitutional action, and with considerable benefit to the local condition manifested in the cases in which the drug has been indicated. The very powerful effects produced by sedative lozenges, which contain but very moderate doses of their respective anodyne ingredients, are also well known. By the use of lozenges the salivary secretion is stimulated; this fact should be borne in mind when giving astringent lozenges, which often tend to increase the dryness of

the throat symptomatic of pharyngeal relaxation, unless combined with a sialagogue, as chlorate of potash (Form. 12, 16 and 17).

The *British Pharmacopœia* contains some formulæ for lozenges which are very useful; but a drawback to them consists in their hardness, the consequent slowness with which they dissolve, and their liability to produce erosion of the mucous membrane.

To obviate these inconveniences the ingredients of all lozenges in the *Throat Hospital Pharmacopœia* have been incorporated with fruit-paste, which not only renders them more palatable, but facilitates their dissolution. I have, however, found considerable gastric derangement ensue, especially in the case of children, from this form of lozenge, and to overcome this objection I have for some three years past combined the remedy with liquorice, which is demulcent and non-irritating. It has, moreover, the further advantage of masking the nauseous tastes of many drugs valuable to administer in this form. The extreme saline pungency of chloride of ammonium, for example, is almost entirely removed when given in combination with liquorice.

Inhalations.—One of the most valuable and effective methods of applying remedial agents to the throat and larynx is by means of inhalations. Like most other valuable forms of treatment, however, it has been carried too far, and applied without due regard to the proportion of anticipated risk and benefit. Inhalations, as used by various authorities, may be subdivided into vapours, aqueous or volatile, atomized fluids, and fumigations.

Vapour Inhalations.—These are either moist or dry, and the moist have been further subdivided into *hot*, when the temperature of the moist air ranges between 130° and 150° Fahr., and *cold*, when the temperature of the moist air is from 60° to 100° Fahr. Dry inhalations can be taken cold, but they are generally hot; that is to say, heat is applied to vaporize certain volatile matters, the fumes of which are inhaled. In my practice dry cold inhalations refer to mixtures combined with the vapour of nascent ammonia, or of others of volatile ingredients to be used with the oro-nasal inhaler, which will be presently described.

For the administration of steam inhalations a suitable apparatus will be convenient. Various forms of inhaler have been devised, all more or less complicated in their nature, and all possessing, according to their designers, peculiar advantages. That devised by myself, and originally made for me by Messrs. Corbyn, and known as Corbyn's improved double-valve inhaler (Fig. LVII.), will, I believe, be found simple and efficacious. The hospital inhaler of Martindale is an excellent and cheap instru-

ment, and that of Ellis (sold by Arnold) is also good. The more recent inhalers of Messrs. Maw's manufacture are great improvements on those formerly constructed. The Carrick and Eclectic inhalers are efficient, but they are very complicated, less compact, and much more expensive than those above named. The cheapest (efficient) inhaler with which I am acquainted has been devised by Mr. Murch, lately Dispenser of the Central Throat and Ear Hospital, and merits description (Fig. LVIII.). It consists of an ordinary quart glass pickle-bottle, closed by a cork bung perforated for tubes, as shown in the illustration. To obviate the necessity for a thermometer, the label is so placed that by pouring

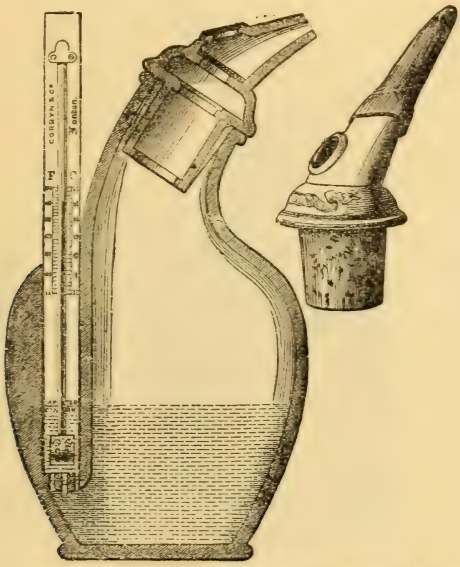


FIG. LVII.—SECTIONAL VIEW OF CORBYN'S DOUBLE-VALVE INHALER, AS SUGGESTED BY THE AUTHOR.

cold water up to the level of its *lower* border, and then adding boiling water to that of its *upper* border, a temperature of 140° to 150° Fahr. is attained. The cost of this apparatus is one shilling.

So-called pocket-inhalers are useless in cases of disease.

With regard to the method of using the inhaler, the following are the printed directions which I give to my patients with their prescription:

'**For Ordinary Use.**—The medicament being added to a pint of hot water at the prescribed temperature, the vapour should be *inhaled* by means of full but not exaggerated inspirations, and should then be gently *exhaled* through the nostrils; in this manner six to eight inhalations may be taken each minute.'

[If our object be to treat only the oral cavity, the palate, the pharynx or the surface of the epiglottis, the patient must be directed to take shallow respirations—avoiding deep ones as much as possible.]

'**In cases of Obstruction of the Passages from the Throat to the Ear**, it is sometimes desirable that the vapour should be forced towards the latter organ. For this purpose, a full mouthful of the steam should be taken, the mouth should then be shut, the nostrils compressed by thumb and finger of one hand, and the cheeks well expanded. This confined forcible expiration

FIG. LVIII.—THE 'MURCH' HOSPITAL INHALER.

must be of only one or two seconds' duration, and must not be repeated oftener than once in a minute, the ordinary inhaling going on in the intervals; in other words, every sixth or eighth ordinary inhalation should be intermitted for one of those just described.'

[It is to be noted that this mode of inflating the Eustachian tube, known as that of Valsalva, is occasionally productive of giddiness. To obviate this tendency I instruct patients to throw the head back during the inflation.]

'**For Nasal Inhalation** an India-rubber nasal-piece should be placed on the mouth-piece of the inhaler, or the orifice, if a jug or other vessel is used, should be narrowed by a cone of cardboard. Insert this nasal-piece into one nostril, the mouth and

the other nostril being closed; after inhaling, gently exhale through the mouth.'

Steam vapour is often required in a room so that the patient may have the benefit of a hot and moist temperature without the effort of inhaling. For this purpose the Bronchitis Kettle is brought into requisition, or better still, the Steam Draught Inhaler of Dr. Robert Lee (Fig. LIX.), which has been recently simplified in construction, and is consequently produced at less cost than formerly by Messrs. Maw and Co.

Dry, Hot Inhalations are of value in many cases of excessive catarrhal secretion. In a medicated form they are difficult of

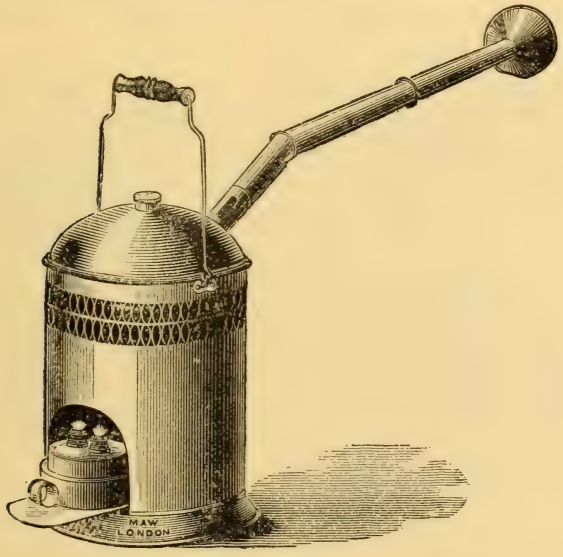


FIG. LIX.—LEE'S STEAM DRAUGHT INHALER.

application, requiring expensive and complicated instruments; but it seems probable that, in a large number of instances, the Turkish bath derives much of its value, not only from its action on the sudatory glands, but also from the topical action of the hot, dry air upon the mucous membrane of the respiratory tract. It would be a good plan if in all Turkish baths tubes were arranged so that this air might be inhaled without the patient going into the hottest or 'radiating' room.

The reason why certain persons declare themselves unable to endure Turkish baths is, in all probability, simply because they fail to observe a few simple precautions which it may be well to repeat for the guidance of intending bathers: 1. Never to bathe at a less interval than two hours after a meal. 2. To put a wet

towel on the head on entering the bath so as to prevent heat-stroke, a fruitful source of palpitations, faintings, etc. 3. To have the body lightly shampooed, and to take a glass of water if perspiration be not active. 4. To always have the head washed as well as the body. 5. Not to take a cold plunge or swimming bath after, but to have a douche—at first warm and gradually cooled down—a warm douche being applied to the feet at the same time as the cold, or *immediately after*. 6. To take sufficient time to cool before dressing, and during the cooling process to keep the whole body and feet also, covered with a wrap. 7. Not to take a bath oftener than twice a week in winter, and once in summer. If attention be paid to these simple precepts, there are few people to whom the Turkish bath will not be at once pleasant and beneficial.

Cold Inhalations.—Having met with many instances in which the use of steam inhalations by persons unable to remain within doors was attended by liability to take cold, I have gradually narrowed their field of application, and have been able to usefully substitute cold inhalations of the vapour of chloride of ammonium, the best instruments for which are those of Allen and Hanbury (Fig. LX.), Kerr, 9, Old Bond Street (Fig. LXI.), and the new one of Burroughs, Wellcome and Co. (Fig. LXII.), an improvement on the very earliest kind of such an apparatus, and now introduced as Vereker's patent. In the inhalers of Kerr and of Allen, the acid and ammonia are renewed by saturation of the pumice-stone and sponge respectively. In that of Burroughs, both acid and ammonia are held in sufficient quantities to last unrenewed for many months. In either case the vapour may be medicated, as is my constant practice, by addition of spirituous solutions of various essential oils to the water-chamber. Formulæ for these are appended (Form. 41).

Under this heading of cold medicated inhalations, I may be pardoned for giving a word of warning against the use of a much-advertised patent invention, known as the Ammoniaphone, which consists practically of an inhaling apparatus of the most rudimentary kind, the inhalant being nothing more than *caustic ammonia* combined with peppermint. A moment's thought should teach us that use of such a mixture—although sometimes of transient benefit in the first instance from its stimulant action—must result in reactionary irritation and relaxation. And this, indeed, is the case, and to such an extent that I have seen many examples of what I call 'Ammoniaphone throats'—an obstinate hyperæmia of both the pharyngeal and the laryngeal mucous

membrane. I am so frequently asked for an opinion on this instrument by professional confrères as well as by patients, that at the risk of being charged with investing the matter with undue importance, I feel that this expression of my experience is not out of place, and it is hardly necessary to add that my remarks apply *mutatis mutandis* to almost every quack throat remedy.

The introduction of the **Oro-Nasal Inhaler**, for which we are primarily indebted to Dr. Coghill of Ventnor, and for strong advocacy to Sir William Roberts, Dr. Burney Yeo, and others, has also been of the greatest service, as by its means vapours can be employed without the risks indicated when thrown off with aqueous steam. The practical value of all these forms of inhalations is generally admitted, and but little heed need be taken of

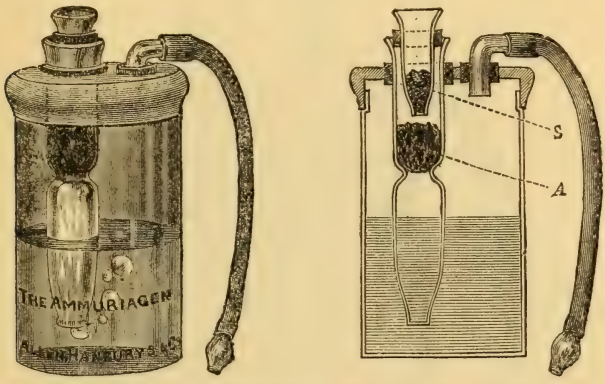


FIG. LX.—THE AMMURIAGEN (ALLEN AND HANBURY).

S is a piece of sponge on which is dropped the ammonia. A, a piece of pumice-stone for saturation with the acid.

laboratory experiments tending to minimize their effect with a view of enforcing the merits of special inhaling chambers. Simple **inhalations of cold air** have lately been extolled by Professor M. Y. Oertel of Munich, in the treatment of hyperæmic conditions of the respiratory organs, more especially of the larynx and of the lungs, brought about by increased activity or over-strains of these organs, as in public speakers, singers, etc. In these cases inhalations of cold air exercise a cooling and refreshing influence on the heated parts, and not only withdraw the heat by exciting the vessels to energetic contraction and diminishing the blood contents, but also avert the exudation and tumefaction of the affected organs, which the hyperæmia may produce. The secondary inflammatory conditions and disturbances of nutrition gradually set up in these persons by oft-repeated

injurious influences will thus be most effectually warded off, and the development of diseases such as chronic laryngeal and bronchial catarrhs, relaxation of the vocal cords, etc., which may

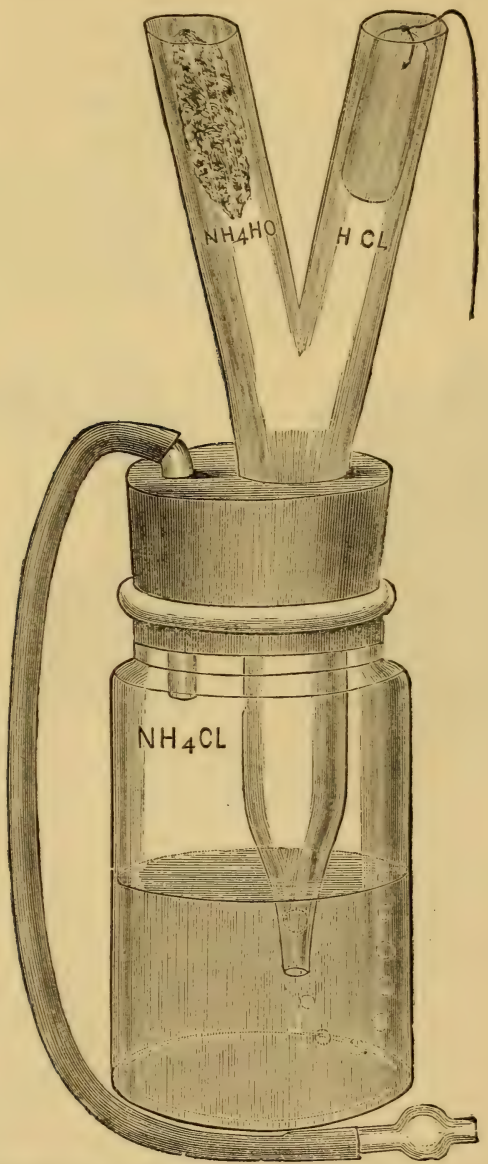


FIG. LXI.—KERR'S CHLORIDE OF AMMONIUM INHALER.

be regarded as professional diseases, will be delayed as long as possible. Non-medicated cold air inhalations are also of use in local erythematous and inflammatory conditions attended with

symptoms of heat, dryness, and smarting, such as erythematous and acute catarrhal inflammation of the nasal mucous membrane, and of that of the oral and pharyngeal cavity, etc. They also bring subjective relief to the patient in parenchymatous and phlegmonous inflammations of the tonsils, of the peritonsillar tissue, of the uvula, of the mucosa and sub-mucosa of the buccal and faucial region generally. Also in the deeper regions, such as the larynx, trachea, etc., the cold inhalation acts beneficially, partly by reason of its low temperature, and partly by its slight capacity for moisture.

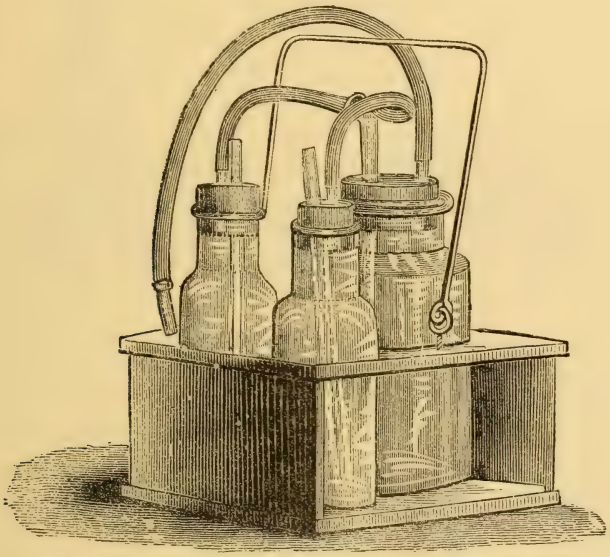


FIG. LXII.—THE BURROUGHS AMMONIA INHALER (VEREKER'S PATENT).

The apparatus for cold air inhalations consists essentially of a spiral tube, through which the air is inspired, fixed into a suitable receptacle, and around which pounded ice is packed. The air which passes through the tube prior to inhalation is thus reduced in temperature; but it is evident that the exact degree of cold must be very difficult to control even approximately.

Compressed Air.—The practice of the inspiration of compressed air, and—what is very like it in its effect—the breathing *into* compressed air, has been advocated for some years, and has of late received increased attention, but principally for the treatment of pulmonary affections, attended by imperfect expansion of the lung-substance. Very brilliant results are claimed by Professor Oertel, of Munich, for this procedure. On the Continent, pneumatic chambers have been brought into use, in which, by means

of suitable apparatus, the atmospheric pressure is varied at the discretion of the medical adviser.

Atomized Fluid Inhalations.—The question of inhalations of atomized fluids has for many years received attention, notably by Hermann Beigel, and in the well-known book of Solis Cohen. More recently Professor Oertel, of Munich, has treated the subject extensively. The time has gone by for doubting the fact that the pulverized fluid *may* pass a considerable way into the air-passages under favourable circumstances, even to the finer bronchi, nor can there be any reason for contesting it. In oral, pharyngeal, and nasal affections, atomized inhalations are doubtless of value, but they are much less serviceable than is generally supposed in laryngeal affections, not only because they are often opposed to the principle previously laid down of adapting remedies to the physiological function of the part, but also because, as a rule, comparatively little of the spray enters the larynx. The moment it impinges on the laryngeal surface of the epiglottis, the vestibule of the larynx closes tightly against the intruder. The patient gives, all the time of inhaling, short, gaspy coughs, with intervals of more severe paroxysm whenever the spasmodic stricture is momentarily relaxed. If a throat be examined after five minutes' use of an atomized inhalation, it will frequently be noticed to be in a state of really considerable hyperæmia. Nevertheless, much of the evil effect of sprays is due to the form of instrument, and also to the nature of the remedy employed; and there are, admittedly, many patients who can attain sufficient command to overcome these difficulties, and to whom remedies of this form of suitable dilution are preferably indicated. My only fear is that their injudicious use, especially in the matter of ingredients, may bring an occasionally valuable remedy into universal disrepute. In accordance with my opinion of the limited value of spray inhalations, the list of formulæ for this kind of remedy is not much extended beyond those suitable for pharyngeal affections.

A valuable method by which pulverized liquids can be taken into the larynx and lungs without any fear of doing harm by mechanical irritation, is that in which the waters of Marlioz (Aix en Savoie), Vichy, etc., are administered, large rooms being charged with clouds of very finely atomized medicated waters.

Sprays may be used, apart from purposes of inhalation, to produce more local effect on the mucous surfaces upon which they are directed, especially to the pharynx and nares. They may be obtained by means of the ordinary spray apparatus, and may, by

the admixture of various medicinal substances, be made anodyne, astringent, antiseptic, resolvent, resorptive, or solvent in their action. Pharyngeal and nasal sprays are frequently of service in disease of the pharynx and naso-pharynx, especially where there is deposit of false membrane, as in diphtheria, or much inspissated mucus, as in ozæna, and in specific ulcerations. In chronic

FIG. LXIII.—PHARYNGEAL SPRAY PRODUCER.

pharyngitis also the continued contact of an astringent spray for some minutes is sometimes more efficacious than topical applications with the brush, and is certainly better if the remedy is to be applied by the patient himself.

A very simple 'Throat Spray' is that of Messrs. Corbyn (Fig. LXIII.), the vulcanite spatula, which is a part of the apparatus, acting well both in keeping the tongue down and in

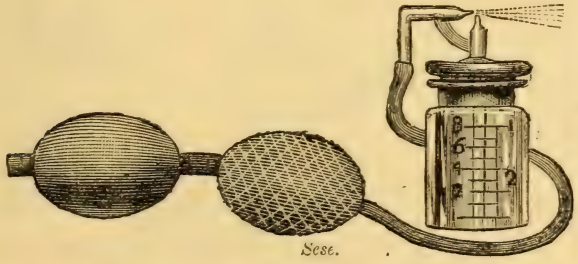


FIG. LXIV.—DOUBLE HANDBALL THROAT SPRAY PRODUCER.

directing the stream of spray to the back of the fauces. Another form of this spray with double handball, by which the stream can be made continuous, or can be broken, is that depicted in Fig. LXIV.). This is the form used by me when applying cocaine as a sedative to the nose or throat before operation. An advantage of the handball spray is that it is non-continuous. The spray

may therefore be projected simultaneously with the act of inspiration, and arrested during ex-spiration, whereas, in Siegle's (Fig. LXV.) and other continuous atomizing apparatus, the spray plays the whole time, and thus probably increases the irritation

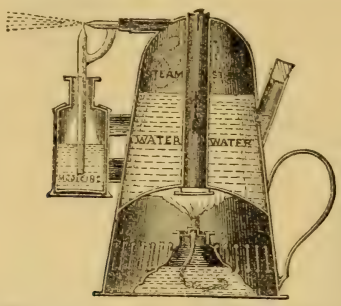


FIG. LXV.—SIEGLE'S ATOMIZER.

which has been alluded to as a not infrequent effect of such measures. But the steam sprays are in some cases preferable, because the atomized vapour is somewhat warmed, which is often a desideratum. The best are those of Siegle, as improved by

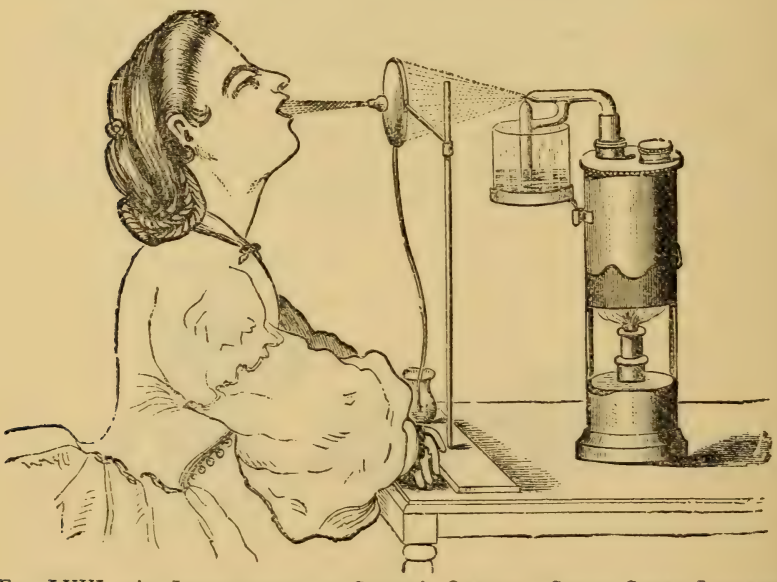


FIG. LXVI.—AN IMPROVEMENT OF SIEGLE'S ORIGINAL STEAM SPRAY INHALER.

Krohne (Fig. LXVI.), and the Universal Atomizer of Codman and Shurtleff, of Boston, U.S.A.

When such diseases as diphtheria have extended into the larynx and trachea, applications of the character of a spray are better

applied directly with one of Türck's or Schroetter's laryngeal syringes (Fig. LXVII.), a procedure which is, of course, not capable of self-adoption.

Oertel recommends the employment of iced water as a spray in hyperæmic conditions of the upper part of the respiratory organs, where the membranes are erythematous and dry, as in catarrhal and phlegmonous inflammations, either idiopathic or symptomatic. Also in chronic catarrhs attended with heat and dryness, in so-called *pharyngitis sicca*, it is invaluable. Seitz has also used it extensively in the treatment of *angina tonsillaris*. In cases where ropy secretion, difficult of expectoration, adheres to the mucous membranes, especially to the posterior pharyngeal wall, as in many forms of pharyngeal catarrh, a partial liquefaction of such masses may be at once effected by this means, and thus expectoration facilitated.

FIG. LXVII.—LARYNGEAL SYRINGE.

By pressure of the finger on the india-rubber-covered receptacle on the handle, the amount of fluid to be drawn into the tube, or to be discharged, can be regulated.

Dr. Lefferts, of New York, recommends sprays applied by pneumatic pressure, and by aid of the mirror, in preference to topical applications by means of brushes, etc., claiming that less irritation of the mucous membrane is thus produced. For my own part, except in a certain well-defined class of cases, I feel satisfied that better results may be obtained by means of solutions accurately applied to the parts diseased by some form of brush, the action of the medicinal agent being thus strictly localized. Moreover, stronger remedies, when necessary, may be used in this way than by means of the spray. The stronger the agent we employ the more necessary it becomes to restrict its action to the diseased area, and this is quite impossible of achievement otherwise than by a brush or analogous instrument.

The Uses of Inhalations.—The varieties of inhalations just described are employed for their action as antiseptics, antispasmodics, astringents, hæmostatics, resolvents, sedatives, and stimulants (capillary, mucous, and salivary). The best time for administering inhalations is, as a rule, before meals. The in-

halation should not be taken rapidly; about six inspirations in a minute being quite sufficient. When the patient is using hot vapour inhalations, it will, of course, be necessary for him to take precautions against catching cold; and for this purpose it is advisable not to go out of doors within half an hour of taking such inhalation. As already noted, even with such precautions steam inhalations are not unattended by reactionary risks. In the case of cold inhalations, however, the patient may go out at once with impunity, and it will even be found, in some cases, that the use of a cold inhalation, just before going out, will procure for the patient an immunity from catarrh which he had not previously enjoyed.

In the administration of sedative inhalations very great care must be exercised, some volatile sedatives, when mixed with steam, having a more powerful action than under other circumstances. For instance, as I many years ago pointed out, the inhalation of even one drop of chloroform in a pint of water at 150° Fahr. will occasionally produce giddiness and nausea. A similar caution applies to nitrite of amyl and aldehyde, several drops of which may, however, be taken from blotting-paper without producing any toxic effect.

Fumigations, or Fuming Inhalations.—In this form the products of carboniferous combustion are inhaled. These inhalations are usually produced by the ignition of unsized paper saturated with nitre or some other substance. The dense fumes which thus arise are inhaled. The papers may be medicated with various stimulating and antispasmodic ingredients. The inhalation can be made from a saucer, or preferably from an old-fashioned cylindrical earthenware spill vase.

In certain cases of tertiary syphilitic laryngitis and tracheitis, as well as on general principles in secondary syphilis, mercurial fumigations, administered in the method recommended by Mr. Henry Lee, or by means of an ingenious apparatus devised by my former colleague, Mr. Francis Hamilton (Fig. LXVIII.), and manufactured for him by Messrs. Krohne and Co., will be most beneficial in effect on the local condition.

The illustration almost explains the instrument without further description. It is only to be noted that A is a lamp for subliming the calomel or other drug used, which is placed in a small drawer B; the fumes pass into the sublimer C, and make their exit with steam from the tube D connected with the water-boiler G. The whole of the subliming apparatus can be removed, and a Siegle tube K substituted at D, the long limb being placed in a bottle

containing the medicated solution to rest on the drawer B. The apparatus then answers all the purposes of an atomizing inhaler. The following are some of the precautions necessary in the administration of mercurial fumigations:

Firstly, the calomel should be the *resublimed* preparation, and not such as is ordinarily used internally in medicine. This is important, as the ordinary calomel is often very irritating for inhalation, owing to the impurities which it contains.

Secondly, the quantity of calomel used should at first only be small, about two to five grains; it can afterwards be increased to ten grains if necessary.

Thirdly, the patient should be cautioned to never inhale more than he can stand without much coughing, and this is especially the case on first employment, when it is as well that he should not take

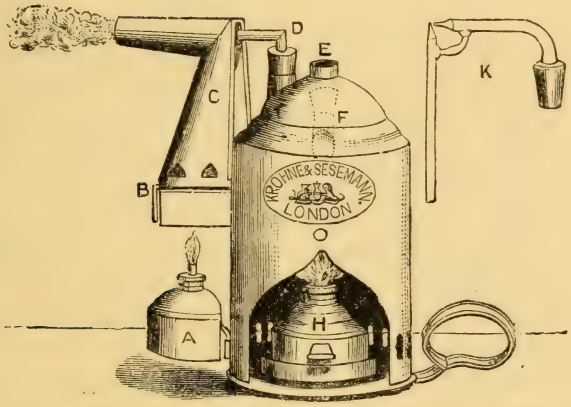


FIG. LXVIII.—HAMILTON'S MERCURIAL FUMIGATOR AND ATOMIZING INHALER.

more than two, three, or four inspirations; after a day or two, he will be able to tolerate it much better. In using the instrument, the second lamp A should not be lighted until the steam is coming off freely from the boiler, as otherwise a dry instead of a moist inhalation would be emitted, and this is as a rule far more irritating.

It will be seen at once that the apparatus can be used as a local fumigator for any part of the body—*e.g.*, for ulcer of the leg—as well as for the larynx.

External Applications to the throat are frequently of great value, and consist of compresses, poultices, pigments, etc.

The following are the printed directions given to my hospital patients for making a wet (laryngeal) compress:

'Take a piece of linen the size of this piece of paper (ordinary

note, 7 in. by 5 in.), or of lint *half* the size. In the case of linen, fold into *four;* or of lint, fold *twice.* Saturate the same with cold water, and place it over the front of the throat, in the situation of the Adam's apple. Cover with a piece of oil silk, waxed paper, or other waterproof material, which must be at least half an inch larger than the lint, in every direction. By lining the oiled silk with flannel, greater adaptability is obtained. Secure by means of a handkerchief tied twice round the neck. A compress applied at night should not be changed until the morning, when the neck should be well sluiced with cold water, and rubbed with a towel.' Compresses are made in convenient form by Roberts of Bond Street. Those for the tonsils would naturally be required of larger size, and the direction then is that the compress should be of dimensions to extend from angle to angle of the jaw.

Authorities differ as to whether the covering is to be impermeably water-tight or simply a dry cloth. My own experience is in favour of water-proof, with the precaution of douching with cold water and friction on removal of the compress. Cold moist applications thus employed are serviceable in promoting resolution in recent congestions and inflammations of a subacute type ; but for more active inflammations or for the ripening of a suppuration, the older-fashioned cataplasm is preferably indicated. Of poultices the best forms are Dr. Lelievre's Iceland moss poultice, the ordinary linseed or linseed and mustard poultice, and spongio-piline.

I have, however, found that external applications of dry cold are generally preferable to heat in most cases of inflammatory disease of the throat. Either cold or heat can be applied continuously by means of 'Leiter's Temperature Regulators' (Fig. LXIX.), and a lengthened experience convinces me that we have in them very valuable agents.

There is, of course, nothing new in the application of cold for the reduction of inflammation, but hitherto the difficulties and inconvenience of applying either dry cold or heat with constancy of temperature in the region of the throat, or indeed elsewhere, have been so great that this method is practically a novelty. The introduction of cold applications to the throat in preference to warm is also, I believe, a therapeutic innovation.

For those not familiar with the apparatus a brief description is requisite.

It consists of a simple leaden coil of narrow calibre, and made of flexible metal tubing, kept in position by pieces of webbing,

and having connected at each terminal a flexible rubber conduit with leaden weights at the end, similar to that employed in the syphon nasal douche. By placing one terminal tube in a vessel of water, slightly above the patient's head, and making suction on the lower tube syphon action is at once established; this lower or egress tube is placed in another jug acting as a receiving vessel on the floor. When the lower vessel is nearly full, the position of the two vessels may be reversed; and by this repeated changing, as required, a continuous flow of water through the

FIG. LXIX.—LEITER'S PLIABLE METAL TEMPERATURE REGULATOR, FOR CONTINUOUS APPLICATION OF WARMTH OR COLD TO DIFFERENT PARTS OF THE HUMAN BODY.

Sp. The spiral regulator applied to the throat with the ingress tube (*is*) in the supplying vessel, and the egress tube (*as*) going out of the drawing. *L.* Lamp for warming the water if hot applications are desired. *T.* Thermometer.

coil is maintained for any length of time without even changing the water. For cold applications a temperature of 60° to 68° Fahr. is often sufficient to abstract heat. That of 50° to 55° gives an effect equal to that of ice in icebags. If a temperature of 35° to 40° be employed, complete anæsthesia can be produced. Even the temperature of 50° cannot long be endured, and requires a layer of flannel between the coil and the applied surface. In case hot applications are required, an ingenious adaptation similar to that used for bath purposes, and known as the 'Geyser,' will

keep up the temperature to the degree required, which is indicated by a thermometer supplied with the apparatus.

This method of applying cold has been principally used by me in cases of tonsillitis, and in all the relief experienced was immediate and marked. It is now always the first prescribed step in the way of local measures. In a case of acute inflammation of the fauces, the result of inhalation of sewage gas, the effect was equally satisfactory. I have also employed it for the relief of pain and promotion of rapid healing after removal of tonsils, and in several cases of cancer of the throat. For this last condition, however, greater comfort and increased ease in deglutition are generally derived from application of heat by the same method. Again, I have thus applied cold over an enlarged thyroid gland, with a result of perceptible diminution of the swelling, and I would recommend it in what one may call acute congestion of this region. This method was also advocated in my paper on the local treatment of diphtheria, before the International Congress in London (1881), but I had not at that time met with a case in which to test its efficacy. Later experience in several instances has more than confirmed my favourable anticipations. In inflammation of the larynx, of both mild and severe type, continuous cold is of marked value. Very striking and indeed complete relief was afforded in a case of traumatic œdema of the larynx (due to the irritation of a piece of rabbit bone, accidentally swallowed) which I saw some two years ago in consultation with Mr. Hobson of Hemel Hempstead. In this instance painful and continuous spasm was at once relieved on application of the coil, but I was asked to pass the night in the house. A relapse occurred about 2 a.m. of such severity as to justify my being called from my bed; when it was discovered that the ingress tube was not in the water, and consequently the flow had ceased. On correction of this defect and renewal of the flow, the spasm was again immediately relieved, and did not return.

The advantages justly claimed for Leiter's regulators are pre-eminently manifested when applied to the neighbourhood of the air-passages, and they are as follows:

1. The effect is strictly local.

2. The temperature is constant; when warm, applications do not become cold, nor cold applications warm.

3. Moisture, with all its attendant inconvenience, is not necessary, but if indicated can be applied by this method, the required temperature being maintained.

4. They are cleanly, light, and not liable to get out of order.

5. Ice, often so difficult to obtain, is not required, the temperature of ordinary pump-water being quite cold enough.

6. Lastly, it is not out of place to mention that the apparatus is so cheap, and capable, moreover, of such diverse application, that (unlike many other novelties in instrumental therapeutics) there need be no hesitation in urging its general adoption.

Of **pigments for external application** the best for purposes of counter-irritation and absorption (the former now rarely employed by me) are the compound liniment of mustard, the liniment, ointment, or the tincture of iodine of the British Pharmacopœia: one coat of the latter may be applied every night with great advantage in chronic laryngitis, and the stain is generally gone before morning. The pigmentum chloralis et camphoræ (Form. 57) will also be found of great value as a sedative in neuralgic affections, and in painful diseases of the cartilages or interior of the larynx. Strong counter-irritation by blistering of the throat on account of internal maladies has been found rather harmful than beneficial in my own experience. 'Mustard leaves' are not recommended; some, which have been procured from the original establishment, have appeared to contain an irritant ingredient foreign to the mustard-seed, which renders them very objectionable.

Douches or Collunaria.—A rough and ready, and, consequently, a very unsatisfactory, method of washing the cavities of the throat and nose, besides gargling, is that of 'sniffing' fluid up the nostrils from the hollow of the hand or from a nasal bath; but special instrumental methods are by preference to be employed. These are the anterior nasal douche, the posterior nasal douche, Türck's laryngeal douche, already mentioned, and the œsophageal douche. The last-named is but little employed, and cannot be recommended, owing to the fact that any fluids applied to the œsophagus are very quickly absorbed or washed away.

The action of the anterior nasal douche on the syphon principle (Fig. LXX.) is based upon the fact that when breathing is carried on with the mouth open, the palate becomes approximated to the pharynx, and a current of fluid sent through one nostril will issue from the other. Instead of the reservoir furnished with ordinary forms of douche, Harrison Allen has devised an excellent instrument (Fig. LXXI.). This consists of a stopper to be adapted to an ordinary bottle, and so made that when the bottle is inverted, the liquid will pass down the tube, while air enters through another smaller tube in such a way as to form no interruption to the flow of the fluid. On account of its cheapness and portability,

as well as on the absence of force in the stream, this form of douche is one that may be safely recommended. The effect produced by the use of the anterior nasal douche, in any form, however, is not very thorough, and it is now almost superseded in

FIG. LXX.—THE ANTERIOR SYPHON NASAL DOUCHE. *a*, SOFT RUBBER NASAL PIECE, EMPLOYED BY AUTHOR FOR DOUCHE AND POLITZER BAG.

N.B.—The elbow I, and the nasal piece are also made of glass, and offer similar advantages as in the case of the insufflator.

my practice by the posterior nasal douche. Besides the inefficacy of the anterior nasal douche, it is, in some cases, absolutely injurious. Dr. Roosa has brought overwhelming evidence in support of his

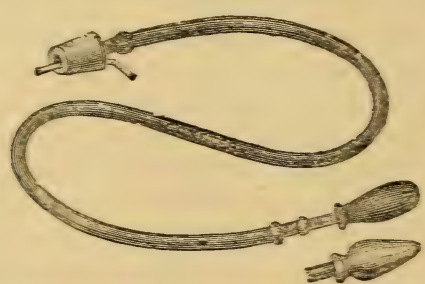


FIG. LXXI.—HARRISON ALLEN'S APPARATUS FOR ANTERIOR NASAL DOUCHE.

statement that the anterior nasal douche, in a considerable number of cases, causes acute inflammation of the middle ear; and his experience has been amply confirmed by myself.

This objection does not seem, according to present experience,

to obtain with respect to the use of the posterior nasal douche (Fig. LXXII.), which is, besides, more effectual in clearing the post-nasal and nasal cavities of abnormal secretion.

Neither of these means are, however, always entirely efficient

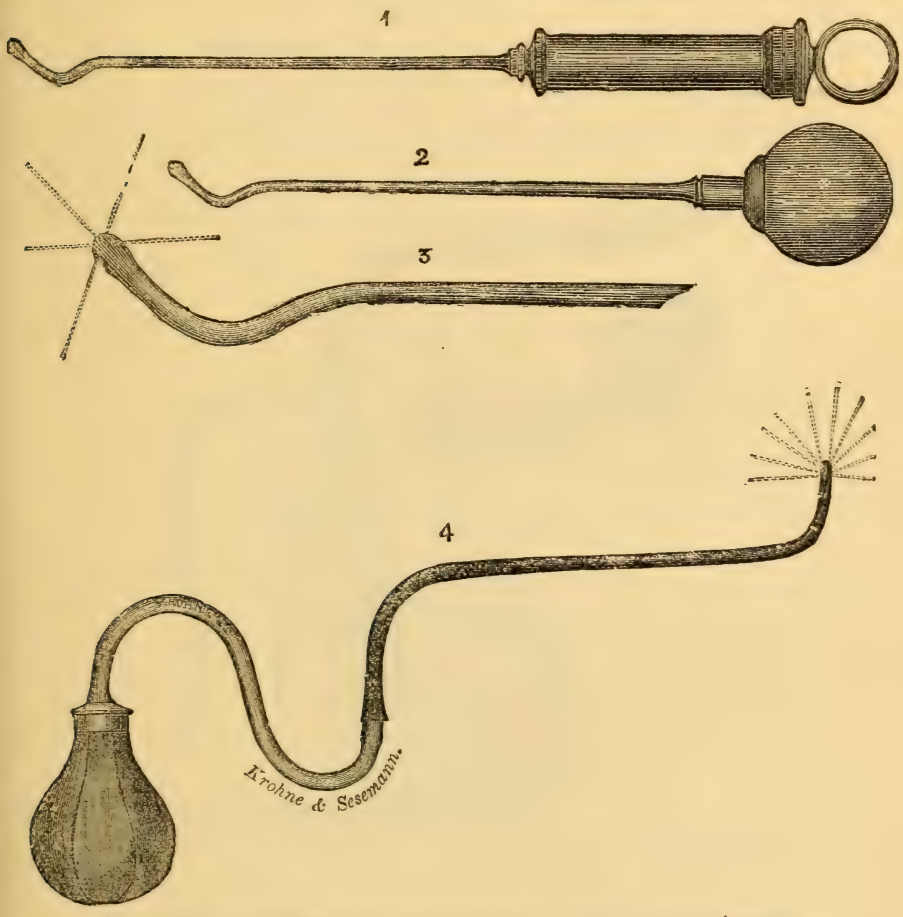


FIG. LXXII.—POSTERIOR NASAL SYRINGES, AS USED BY THE AUTHOR.

Nos. 1 and 2. These forms are the best for a practitioner to employ. No. 3 shows the stream as it comes from the different points; Nos. 1 and 2 and 4 are drawn half dimensions; No. 3 is of full size. The instrument is made of vulcanite, and the exact curve of the tube can be altered at will by well oiling it and then heating it over a spirit-lamp. Recently some tubes have been made of virgin silver, which can be readily adapted to any curve or angle. No. 4 shows the same syringe more conveniently adapted for self-use.

in removing nasal incrustations in chronic atrophic rhinitis (ozæna) and the 'Coarse Nasal Spray' of Lefferts (Fig. LXXIII.) is a valuable addition for this purpose to our therapeutic armamentorium. This apparatus is made in this country by Krohne and

Co., who have, at my suggestion, graduated the bottle. The following are the printed directions, modified from Lefferts, pasted on the lid of each box containing the instrument:

1. Dilute the medicated fluid with the prescribed proportion of hot water, so that the solution is about a temperature of 95° (blood heat).

2. Stand erect, and incline the head very slightly forward over a toilet basin.

3. Introduce the conical nozzle of the apparatus into one nostril,

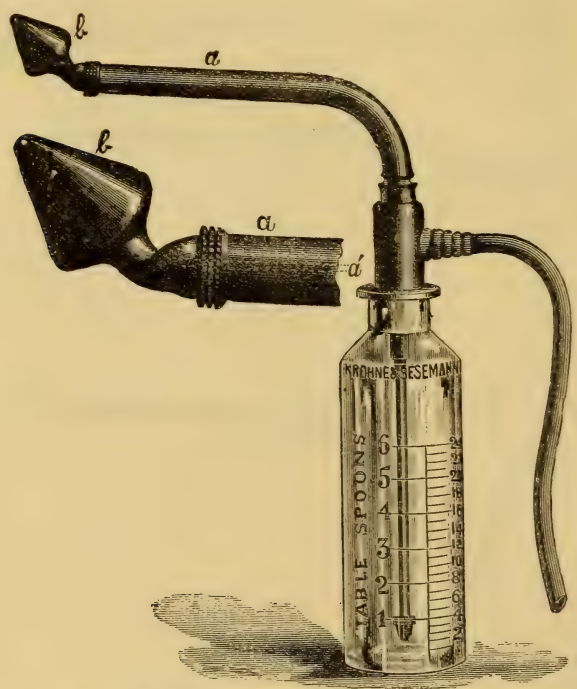


FIG. LXXIII.—THE 'LEFFERTS' COARSE SPRAY (TWO-FIFTHS MEASUREMENT).
a. The vulcanite tube, containing the atomizing tube (*a'*). *b.* The nasal piece, full size.

and far enough to close it perfectly, holding the horizontal tube of the apparatus directly outwards from the face.

4. Open the mouth widely and breathe gently but quickly through it in a snoring manner; avoiding carefully all attempts at speaking, swallowing, or coughing.

5. Hold the end ball of the apparatus firmly in the right hand (the left holding the bottle), and *work it briskly* until the spray of medicated fluid, which should be felt at once to enter the nasal passage, has passed around it and appears at the opposite nostril. At the moment that the fluid passes into the upper part of the

throat from the nostril which is being operated on, a desire to swallow will be experienced; resist it, and the next second the fluid passes forward.

6. Having used half the fluid, remove the apparatus, and repeat the operation upon the opposite nostril.

7. Before removing, allow the ball to collapse, so that *all* the air may be pressed out. On removal of the nozzle, blow the nose gently—*never vigorously*.

Should the nostrils not be entirely cleansed by these means, it is recommended that the patient use, a few minutes after, a warm saline douche of two ounces by means of the anterior nasal

FIG. LXXIV.—AUTHOR'S NASAL HAND SYRINGE (HALF MEASUREMENTS).

syringe which I designed for the purpose (Fig. LXXIV.), an instrument which can be easily substituted by covering the glass nozzle of a Gilbertson two-ounce syringe with a soft rubber teat, the hole of which has been enlarged. Recently I have given directions that all terminals for introduction into the nostrils are to be made oval, the shape of the nostril, instead of round. This ensures more perfect introduction and less risk of distortion of the nasal orifice on long-continued use of the instrument.

Douches are generally used as antiseptic and deobstruent irrigations, and occasionally also as hæmostatics.

Tampons of wool, medicated with iodoform, hamamelis, and other drugs, and *bougies* made of gelato-glycerine (the Gossypia

and Buginariæ of the *Throat Hospital Pharmacopœia*), have not, on trial, justified their recommendation. Ointment and thickened fluid solutions, made with wool-brushes of varying sizes, according to the amount of pressure and dilatation required, are found by my colleagues and myself to answer all purposes claimed by the newly introduced remedies under the above fanciful titles.

Pigments for Internal Application.—These can only be applied by the patients themselves to the pharynx and anterior—by some to the posterior—nares. For application to the pharynx aqueous solutions are the best. If it be desired that the substance should remain long in contact with the part, it will be found well to mix it with bismuth and starch or mucilage, or to add a little glycerine. Undiluted preparations of glycerine are very irritating in all catarrhal conditions of mucous passages, owing to the peculiar attraction of glycerine for water. For applications to the nares, vaseline or lanoline will be found very useful media; these substances being absorbed by the nasal mucous membrane, while oils and cerates are not.

All pigments should be applied with some form of brush. It is, as a rule, much more difficult to apply solutions accurately with a sponge; though many excellent practitioners use this last material secured in a suitable holder, employing a fresh morsel for each case (Figs. LXXV., LXXVI., and LXXVII.). Dr. Smyly, of Dublin, instead of a brush of hair, uses pieces of aluminium suitably bent and fixed in a wooden handle; round the roughened ends of the metal he twists a piece of absorbent cotton-wool, using a fresh piece for each patient (Fig. LXXVIII.). This material is very suitable for pharyngeal, and especially for nasal applications, and, both on æsthetic principles and as a precaution against the risk of contagion, is preferable for general use, whether in hospital or private practice, to a brush employed repeatedly and indiscriminately for several individuals. Having more than once witnessed the unfortunate accident of fracture of the aluminium at its juncture with the handle, I now employ only whalebone or vulcanite wool-holders made in one piece; and to avoid the possible risk of the wool dropping off, the end is perforated, and the wool is threaded in the holders to be used for laryngeal application as shown in Fig. LXXIX., in which are also illustrated the varying shapes of the wool. In the case of children, where the use of the brush, or of any instrument, is a matter of difficulty, it will be found a good plan to wrap a piece of lint round the index-finger, as this can be often inserted where a brush or a sponge could not.

Pigments may be used for their antiseptic, astringent, sedative, solvent, or stimulant action.

CLASS II. includes all intra-laryngeal operations, some of which

FIG. LXXV.

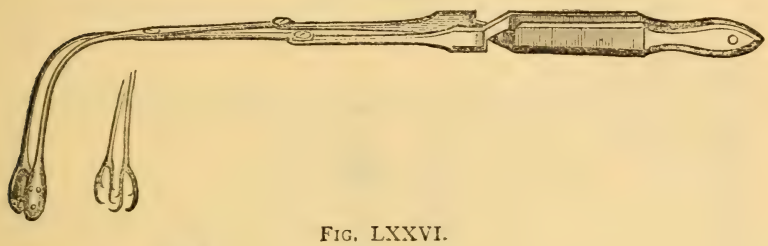


FIG. LXXVI.

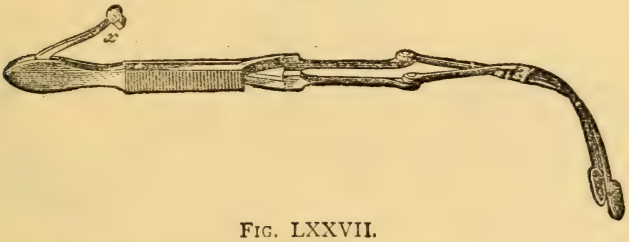
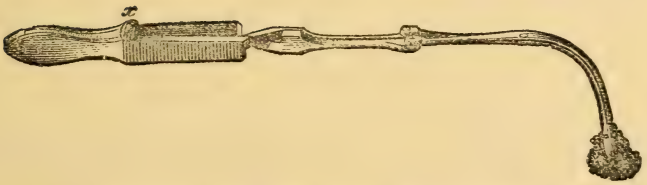


FIG. LXXVII.



SPONGE-HOLDERS (TWO-THIRDS MEASUREMENTS).

Fig. LXXVI. represents the instrument open, and Fig. LXXVII. the same closed by the catch *x* so as to secure the sponge.

have already received notice. These, in my own practice, are mostly confined to fluid applications with a brush, solid applications with a porte caustique, insufflations, the galvano-cautery,

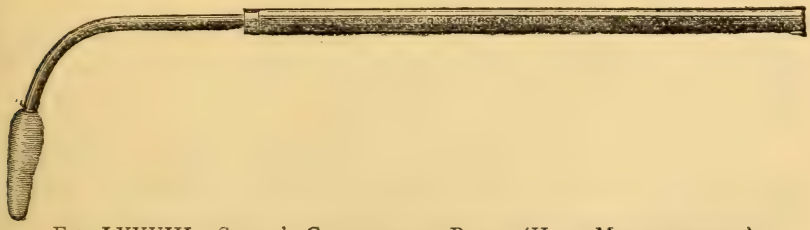


FIG. LXXVIII.—SMYLY'S COTTON-WOOL BRUSH (HALF MEASUREMENTS).

and the use of surgical instruments of various kinds. The direct topical application of laryngeal sprays, as advised by Lefferts and other American authors, would also come under this heading.

Whenever it is necessary to apply solutions low down into the larynx, care should be exercised not to overcharge the brushes. In the case of ulceration, or where a local sedative effect is desired to be prolonged, the fluid may be thickened, as already described.

With regard to the best form of instrument for making applications to the larynx, laryngologists differ in opinion, and each

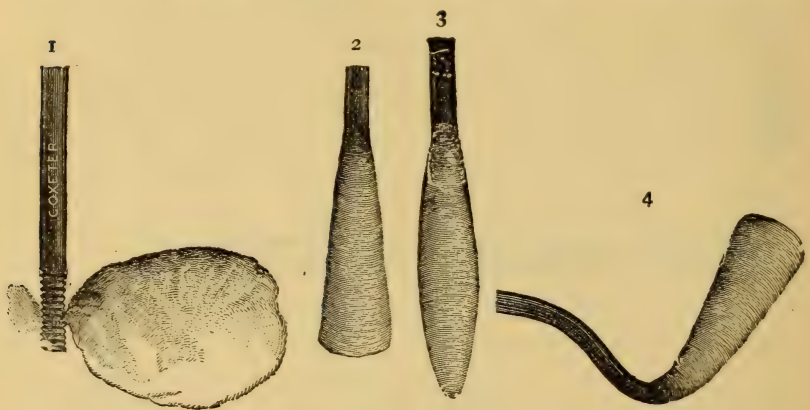


FIG. LXXIX.—TERMINALS OF COTTON-WOOL BRUSHES (FULL SIZE).

1. Mode of threading cotton-wool into whale bone or vulcanite holder. 2. Square-ended cotton-wool brush. 3. The same pointed. 4. Post-nasal cotton-wool brush.

practitioner will doubtless suit his own fancy in this respect. The shape of the brush employed, for the most part, in my own practice (Fig. LXXX.), is that of a curved right angle, less square than those usually recommended. The great fault of most brushes sold by instrument-makers is that they are too large. Every brush for the larynx should be capable of being drawn to a

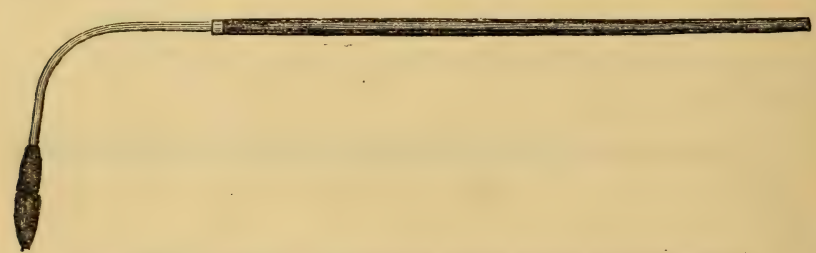


FIG. LXXX.—AUTHOR'S LARYNGEAL BRUSH (HALF MEASUREMENTS).

fine point, like a water-colour painting-brush. The size should be that known to artists' colourmen as 'goose-quill.' As just indicated, hair brushes are almost entirely superseded in my practice, both public and private, by those of absorbent cotton-wool, which can, of course, be made of any size or shape necessary to the requirements of individual cases.

Insufflations of powders may be conveniently administered by the instrument figured below (Fig. LXXXI.); but for more accurate application, and especially in laryngeal and œsophageal disease, the insufflator of Labiersky (Fig. LXXXII.), sold by Krohne, is far preferable. Insufflations have been much in vogue

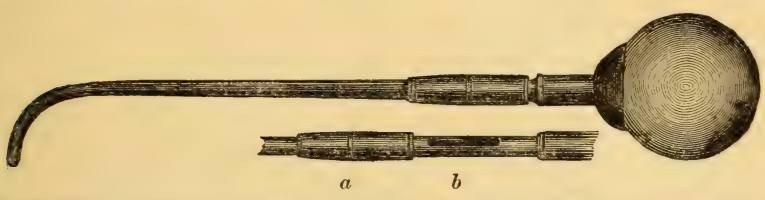


FIG. LXXXI.—VULCANITE INSUFFLATOR FOR APPLYING MEDICATED POWDERS TO THE THROAT.

The portion of the tube *a* slips up and discloses a receptacle, *b*, for the powder. When charged, the telescope part, *a*, can be slid back. N.B.—This instrument is now made in glass, the transparency of which is convenient in case of obstruction; it is also more easily cleaned.

of late years for nasal, pharyngeal, and laryngeal diseases. I have given them a fair trial, and find that—1. In nasal diseases, taken as snuffs, they are as useless as the unphysiological ground on which they are recommended would lead the practitioner to

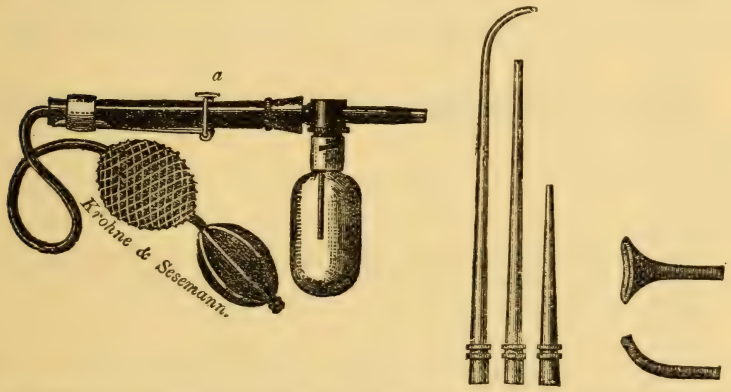


FIG. LXXXII.—LABIERSKY'S LARYNGEAL INSUFFLATOR WITH VARIOUS TERMINALS.

The instrument is worked by pressure on the spring (*a*), the ball having been previously inflated.

expect; for if there be excess of thin rhinal secretion, it is by powders made thick; if the secretion be thick, it is made thicker. In any case the orifices of the glands are obstructed, and though the result may be less discharge, it is at the expense of increase of inflammation of the mucous membrane, and probably of incrustations leading to erosion and ulceration. 2. In the pharynx

insufflations of iodoform and other remedies are sometimes serviceable in painful ulcerations, though they are not often used in my own practice. The only conditions in which I have found powders to be really of benefit are tuberculous thickening and ulceration of the epiglottis, and in malignant diseases. In these cases direct applications by means of an insufflation of a medium of bismuth, starch or tragacanth, containing morphia in varying proportions, are attended with the best results, and the remedy in this form can be better applied by the patient than can a liquid. The latter form is, however, on many accounts, preferable when the practitioner makes the application, as the remedy can be applied with far greater accuracy. Powders may also be applied to the œsophagus with good results, and are probably the best form of topical remedy for that region. Laryngeal insufflations for congestion and the minor forms of disease situated below the epiglottis are not only unnecessary but are often injurious rather than beneficial. They are, moreover, often administered quite inappropriately, as, for instance, in a case recently under my notice, to give relief to the cough of an aneurysm of the aorta pressing on the left recurrent laryngeal nerve.

The most economical, convenient, and for general purposes safest, caustic-holder (Fig. LXXXIII.) is a piece of curved aluminium rod—an old brush-handle may be conveniently used—which is

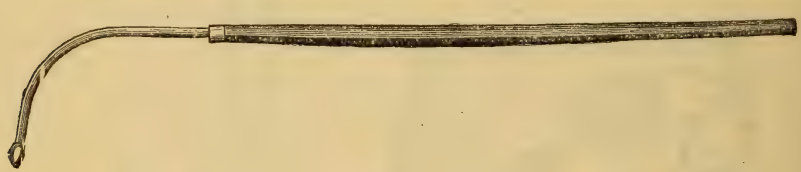


FIG. LXXXIII.—SIMPLE CAUSTIC HOLDER FOR PHARYNX AND UPPER PORTION OF LARYNX, VIZ., AN ALUMINIUM ROD CHARGED WITH FUSED NITRATE OF SILVER (HALF MEASUREMENTS).

charged by simply dipping the point into fused nitrate of silver: a little of the silver salt can be kept in a porcelain crucible and melted by means of a spirit-lamp when it is required to recharge the aluminium points. It is, however, occasionally necessary to have guarded caustic-holders. Instruments constructed on the principle of Lallemand's urethral cauterizer are the best.

One of this description, the latest of its kind, is shown in Fig. LXXXIV. It is a modification devised by Dr. Jarvis, of New York, and is recommended by him for the especial purpose of making applications of fused chromic acid to laryngeal growths not easy of removal by snares. For this purpose I have myself

usefully employed it, as well as for ordinary cauterizations. The instrument consists of a cannula containing a movable metallic rod, the latter being continued in the form of a spiral spring at the curved portion of the tube. A probe-pointed piece of wire is riveted to the extremity of this spiral spring to preclude the possibility of the accidental displacement and lodgment of the caustic carrier in the larynx. The spring also serves as a buffer to deaden the force of the probe's impact against the growth. The handle of the applicator is hollow to receive the spring, which is set and relieved by a rack movement under the control of the operator. The tension of the spring is regulated by the set screw at the distal end of the handle, on the principle of the tube forceps.

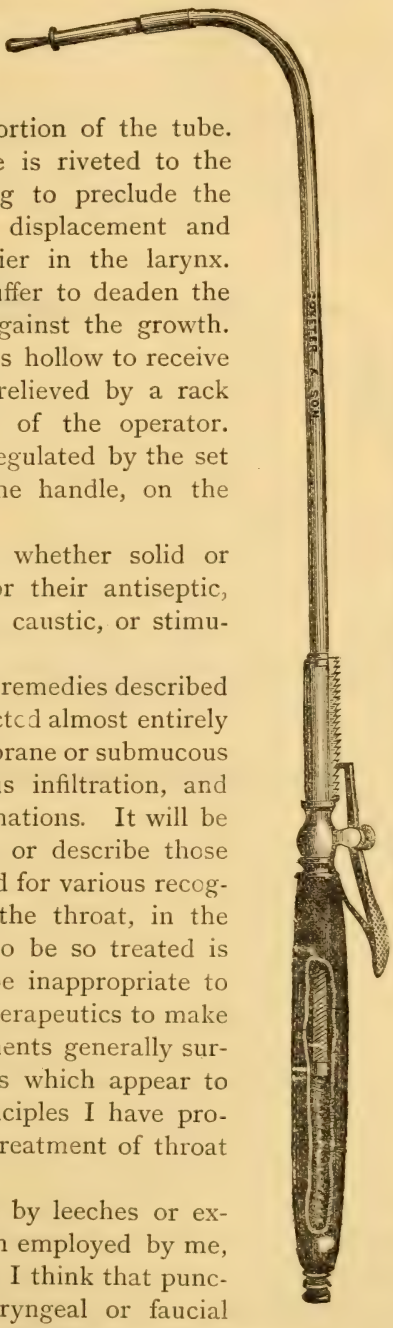


FIG. LXXXIV.—JARVIS'S GUARDED LARYNGEAL PORTE-CAUSTIQUE.

Applications to the larynx, whether solid or liquid, are used principally for their antiseptic, astringent, sedative, resolvent, caustic, or stimulant action.

Up to this point the forms of remedies described have been those which are directed almost entirely to diseases of the mucous membrane or submucous tissue, with absence of serous infiltration, and prior to the stage of new formations. It will be more convenient to allude to or describe those instruments which are required for various recognised surgical operations on the throat, in the places in which the disease to be so treated is considered; but it may not be inappropriate to our consideration of general therapeutics to make mention here of some instruments generally surgical, and also of some others which appear to me to be opposed to the principles I have promulgated for guidance in our treatment of throat affections.

Bleeding and Scarification by leeches or external cupping have never been employed by me, and are not advocated; nor do I think that punctures with the lancet of pharyngeal or faucial swellings, unless there is distinct evidence of the presence of pus,

are attended by more than slight and temporary relief; but in the larynx, where œdematous swelling may occur to such an extent as to endanger life, scarification by means of the laryngeal lancet (Fig. LXXXV.) will often be found necessary, and its use will be followed by noteworthy benefit. The unguarded laryngeal lancet is a very dangerous instrument.

With regard to instruments for removing growths from the larynx, my firm conviction, based on experience, is that those now

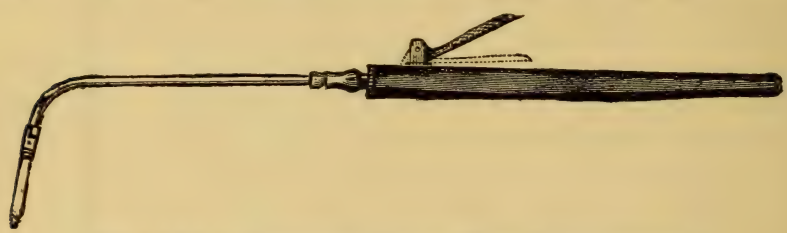


FIG. LXXXV.—LARYNGEAL LANCET (HALF MEASUREMENTS).

most generally in use are far more dangerous than those formerly employed. At first, all instruments for the removal of growths were on the principle of a snare; gradually, however, we got tube forceps, guillotines, rigid loops with sharp edges, fenestrated knives, forceps, some of them strong enough to break a vesical calculus, scissors, knives, guarded and unguarded, and the galvano-cautery.

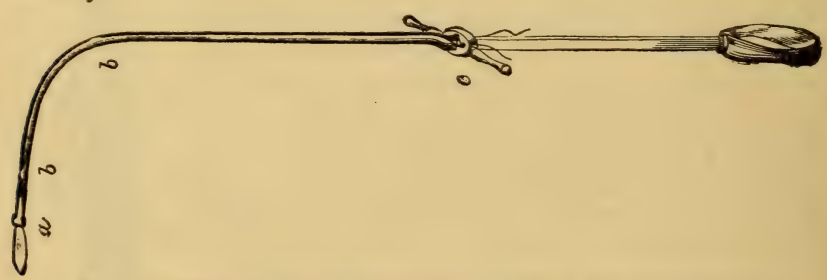


FIG. LXXXVI.—GIBB'S LARYNGEAL SNARE (HALF MEASUREMENTS).

The wire loop passed through two eyes at *a* travels along an open cannula tube, bridged at *b b*, and is secured at *c* to the movable crosspiece, traction on which diminishes the size of the loop. This cross bar may often be conveniently changed from the horizontal to the perpendicular position.

This work being intended mainly for the general practitioner, and laryngeal growths being happily rare, it is not necessary to enter largely into the subject. It may, however, be stated as a general principle, with respect to laryngeal instruments whether for growths or otherwise, that it is impossible for them to be too delicate, and that they should all be constructed on the axiom '*Primum non nocere*.' The laryngeal snare of Gibb (Fig. LXXXVI.) is a most

valuable instrument for many small pedunculated growths, and the guarded instruments of Stoerk and Jellenfy are also constructed in accordance with the proposition just laid down. My colleague, Mr. Carmalt Jones, has recently devised an excellent instrument (Fig. LXXXVII.), which I have successfully employed in several operations. Its principal feature of improvement consists in the instrument remaining fixed at the point at which it is placed while the wire noose is being drawn up. Another instrument of great value, and more generally employed by some of my colleagues than by

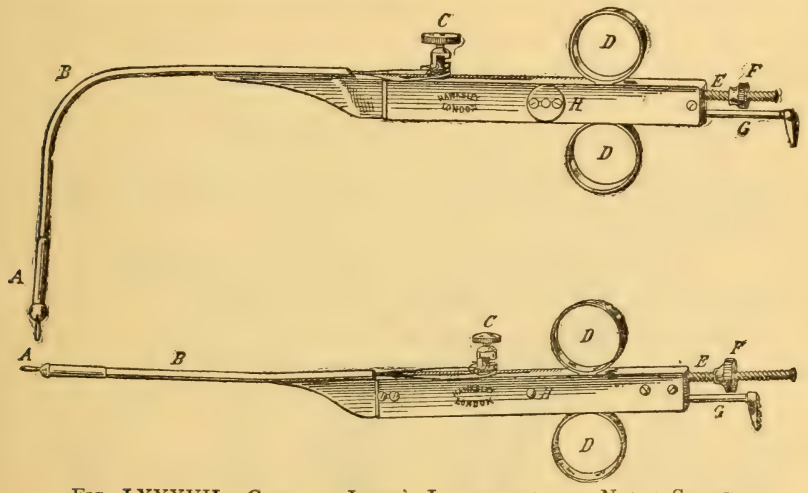


FIG. LXXXVII.—CARMALT JONES'S LARYNGEAL AND NASAL SNARE.

A is a movable cap, with two holes through which the wire of the snare passes. B, the tube guarding the wire, the ends of which are fixed to a screw-catch, C. E represents a bar continued through the body of the instrument; the catch C is fixed on to this bar, and runs in a slot in the top. F is a nut running on E; it regulates the size of the loop, and by increasing the leverage is useful when the part to be divided is very tough. G, a bar similar to E, but ending in a plate for pressure of the thumb of operator. H, a pinion; the bars E and G are racked and work against H. Pressure driving in G causes H to revolve, E to be drawn out, and consequently tension is made on the snare. The cap A allows of the snare being turned round in the axis of the distal part of the tube to any angle, and by pulling off the cap the snare is reset after use—all that is necessary is to shape it. The wire used is steel piano-wire.

myself, is the laryngeal sponge probang, first described in print by Voltolini (Fig. LXXXVIII.), though the method had been pursued by my deceased friend, Llewelyn Thomas, some years previous to the publication of Voltolini's paper. One case is mentioned in my first edition (1878). Tube forceps and rigid cutting-loops are sometimes useful, but neither are absolutely safe against the risk of doing injury to healthy tissues. All unguarded forceps are dangerous, and can hold no necessary or justifiable position in the surgeon's laryngeal armament. In this opinion I have been supported by my colleagues at the Central

London Throat and Ear Hospital during a period of over twelve years, and no laryngeal growth has been removed in that institution by an unguarded instrument.

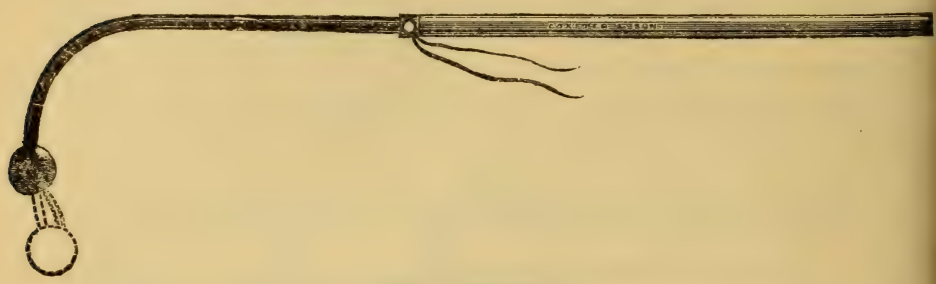


FIG. LXXXVIII.

VOLTOLINI'S LARYNGEAL SPONGE PROBANG (ONE-THIRD MEASUREMENTS).

To show that these words of caution are not uncalled for, facsimile copies have been made, and are here inserted, of some

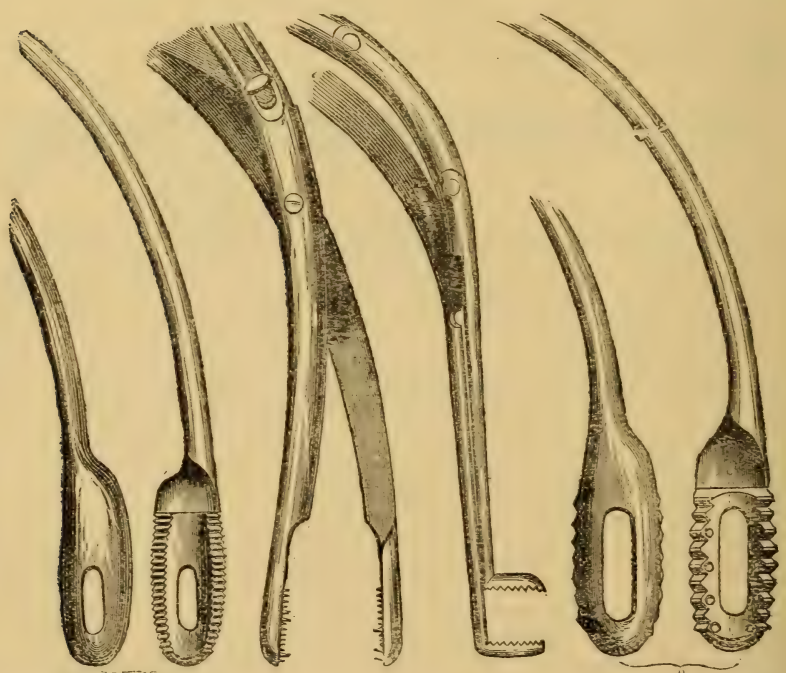


FIG. LXXXIX.—SOME VARIETIES OF FAUVEL'S LARYNGEAL FORCEPS FOR REMOVAL OF GROWTHS (FULL MEASUREMENTS).

of the instruments used by Fauvel and figured in his work (Fig. LXXXIX.).

The application of induced electricity to the pharynx, larynx and

œsophagus by faradization is often called for. It has also been recommended to be applied to the Eustachian tube through either the posterior or anterior nares, and again to the membrana tympani. The best instrument for these purposes is that of Mackenzie (Fig. XC.), slightly varied according to the part to be treated. This consists of a necklet (*B*) in connection by a chain (*ch*) with one pole of the battery, the other being conducted to an electrode (*A*), so arranged that the current (*c*) does not pass from the point (*f*) until a small spring (*d*) in the handle is pressed upon by the finger. The advantage of this is that no current is passed into the larynx until the instrument is in the required position; *e.g.*, in contact with the vocal cords. The inventor of this instrument has also described double electrodes, by means of which it is supposed that particular muscles of the larynx may be subjected to the action of the electric current. Such ideas can only be regarded as flights of too vivid imaginations, or, at least, as

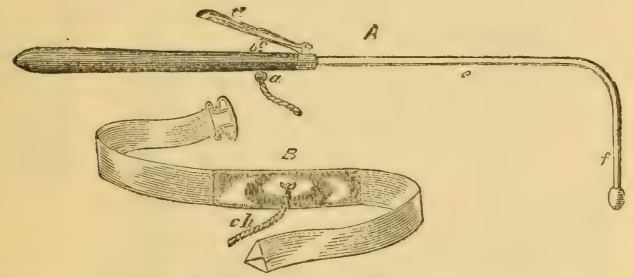


FIG. XC.—LARYNGEAL ELECTRODE (ONE-THIRD MEASUREMENTS).

pertaining to details of specialism too refined for present consideration. It is to be noted that in many cases application of the current percutaneously is sufficient without introduction of the electrode into the throat; nor is it by any means necessary in all circumstances even to attempt to enter the larynx—for a brisk current to lips, tongue, or fauces, if *accompanied by firm moral influence and encouragement* of the patient, will frequently restore a voice lost by simple functional causes.

I agree with Schech that **Massage** of the throat is of very doubtful value.

Galvano-Cautery.—Another application of electricity to therapeutic purposes is found in the galvano-cautery, which has proved useful in many cases of throat disease, especially those of a specific character, as well as in some affections of the nose and ear.

The apparatus (Fig. XCI.) which I am in the habit of using,

and which was made for me more than ten years ago by Messrs. Mayer and Meltzer, consists of a battery of two cells charged with bichromate of potash solution, each cell having four zinc and

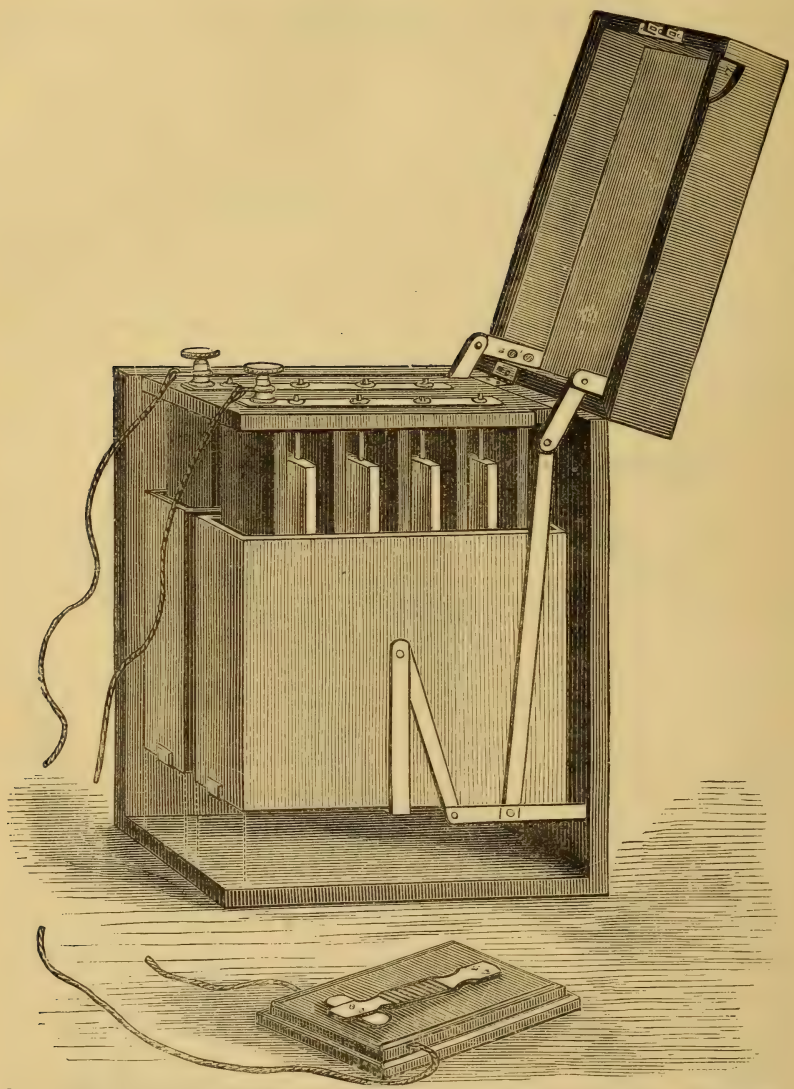


FIG. XCI.—AUTHOR'S GALVANO-CAUSTIC BATTERY, WITH FOOT-PIECE (MAYER).

The side of the battery is taken out to show the arrangement for bringing the plates in contact on lifting the lid.

carbon plates. This battery is very convenient in size, measuring only 12 inches in height by 9 inches square. Contact is made by the foot of the operator pressing on a key, both hands being thus

left free, while at the same time the current is entirely under the control of the operator himself. For all practical purposes this battery is quite as serviceable as one of Grove's, while it possesses obvious advantages over that instrument in the matter of prime cost, in the greater durability of material, and consequently lessened expenses of working; in portability and convenience for use; and lastly, what is no slight matter in practice, in absence of smell. Another illustration of this battery with elec-

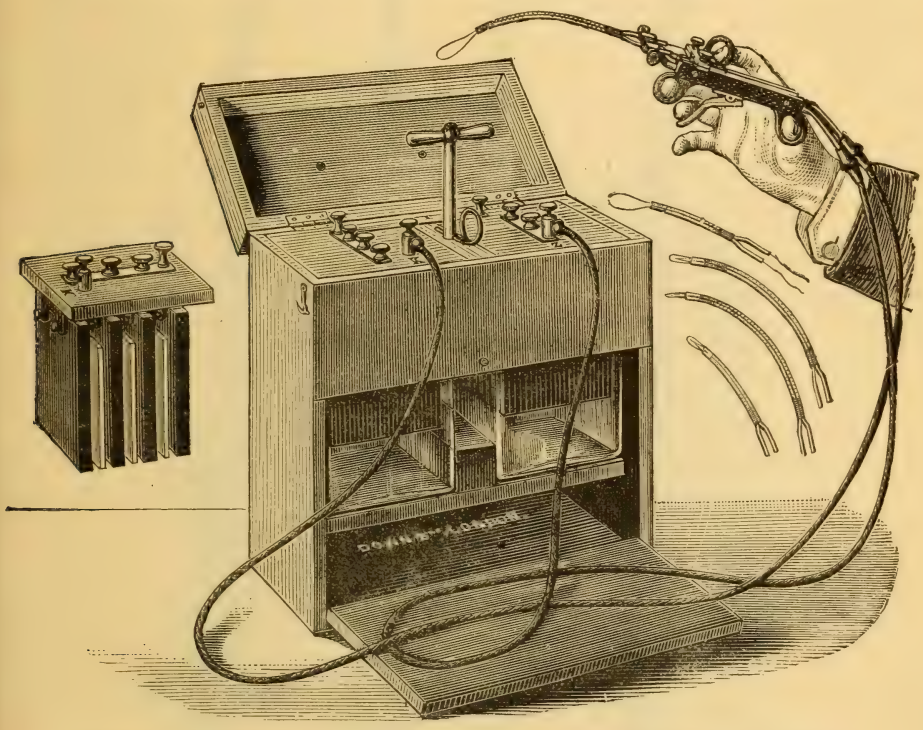


FIG. XCII.—AUTHOR'S GALVANO-CAUSTIC BATTERY AND ELECTRODES (DOWNS).

trodes is shown in Fig. XCII. The latter are also delineated on a larger scale in Fig. XCIII.

Until quite recently I employed alternatively a smaller but more powerful battery, made for me by Coxeter; but this is now superseded by the excellent battery supplied by the Electric Power Storage Company (Fig. XCIV.), as adapted by the same maker. It can be had with from two to any number of cells, the price, which is moderate, being at the rate of about thirty shillings a cell. For private requirements two to four cells are ample, the current lasting without re-charging for an average of three months with daily use. They are absolutely reliable, but cannot be employed without the regulating rheostat which Coxeter has fixed.

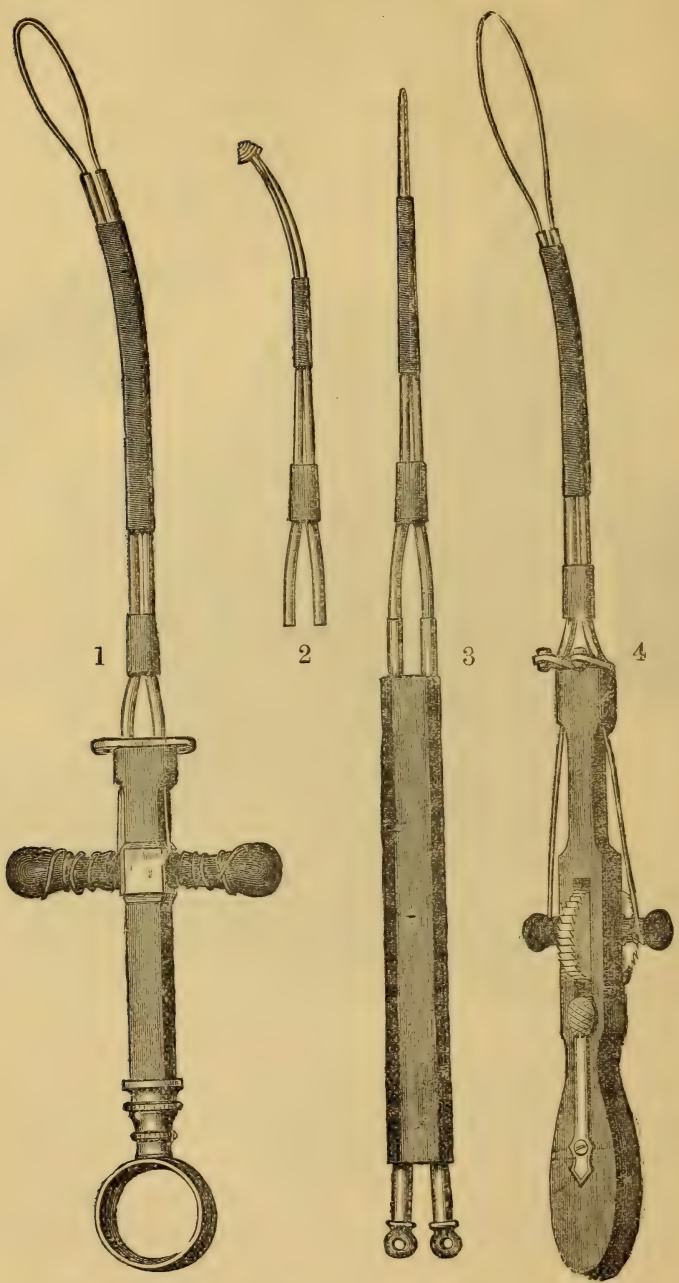


FIG. XCIII.—GALVANO-CAUSTIC LOOPS AND POINTS (HALF MEASUREMENTS).

The insulated conducting cords are for convenience twisted together, except at the ends where they branch off to be attached at the separate poles of the battery and to the cautery handle; they are made light and flexible, a great desideratum to the operator. The battery is put into action by pushing back the lid of the case, and is out of action when the lid stands vertical or the case is closed.

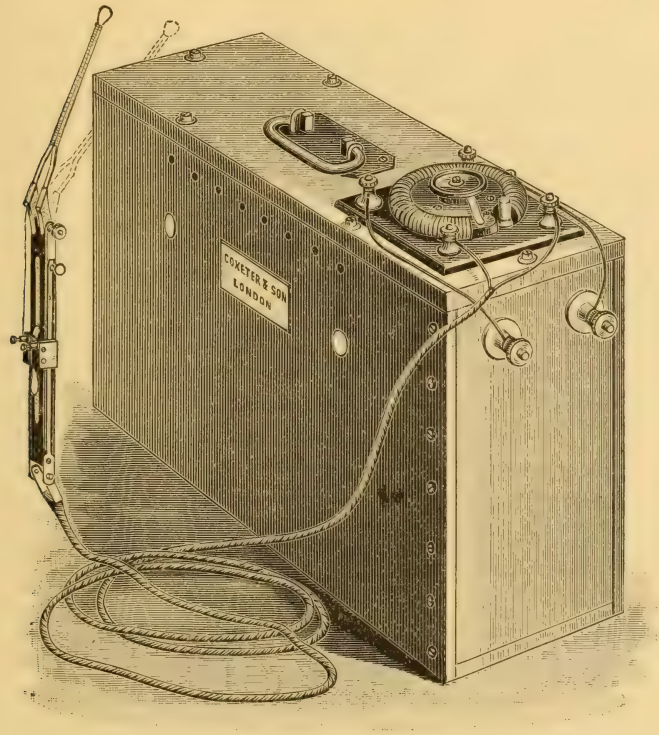


FIG. XCIV.—E. P. S. CAUTERY ACCUMULATOR WITH RHEOSTAT.
A, for graduating the strength of current.
B, new cautery handle with rack movement instead of screw, etc., for hot or cold snare, etc.

Papers, with cases treated, were read by me on this subject at the Manchester meeting of the British Medical Association (1877), and again at the International Medical Congress in London (1881); the following are the conclusions at which I have arrived:

1. That the galvano-cautery is most useful, being more rapid and permanent and less painful than mineral forms of caustic, in

tertiary specific ulcerations of the fauces and soft palate, especially in cases of perforating ulcer, and when the disease is congenital or hereditary, or where there is a combined scrofulous diathesis; and also for destruction of varicose veins of the pharynx in chronic pharyngitis, and at the base of the tongue. It is for this and all other purposes in which the cautery is indicated far more convenient than any form of actual cautery, since it can be introduced along delicate cavities cold, and after cauterization be withdrawn cool; moreover, its action is limited to the point touched.

2. For removal of enlarged tonsils, the method is unnecessarily painful and tedious, and generally inefficient; but it surpasses any other for destruction of diseased lacunæ in unenlarged or atrophied tonsils. It may, however, be advantageously employed for removal of the relaxed tissue of an elongated uvula.

3. That in diseases of the larynx, except where occurring in the epiglottis, the cautery is inadmissible, since there is great danger of doing serious injury to healthy tissues.

4. That it is valuable in many cases of hypertrophy of tissue in the vault of the pharynx, though when so employed precautions are necessary to prevent extension of inflammation to the middle ear.

5. That it is almost invaluable as an escharotic and alterant in those cases of nasal and naso-pharyngeal disease in which the secretion is altered, whether the change be that of excessive flow with limpidity, or arrest and inspissation, the two representing not infrequently but different stages of one pathological condition.

6. That nasal polypi, being first secured by suitable self-holding forceps (varieties are shown in Fig. XCV.), can be most completely removed by the cautery loop (Fig. XCIII., 1 and 4), with the minimum of pain and hæmorrhage, as well as without risk of injuring surrounding parts. Subsequent to this opinion given at Manchester—and as expressed in my later paper at the Congress—I now preferably remove the polypi with the ordinary cold wire snare or forceps (Figs. LXXXVII., XCVI., XCVII., XCVIII., or XCIX.), and reserve the cautery for later applications with the intention of destroying the surface of the bases of origin.

7. That scrofulous ulcerations, diseased bone, and submucous thickenings or outgrowths in the same region can be treated with equal success, and better, by the cautery loop than by the cold snare or forceps.

8. That after removal of aural polypi in the ordinary way, the cautery may be applied with a fine-pointed instrument (Fig. XCIII., No. 3) with advantage to base, with a view of preventing recurrence.

9. That the cautery (with the same cautery-point) may be useful, under certain precautions, in those cases in which it is desired to make a permanent perforation in the tympanic membrane.

10. That the risk of hæmorrhage from galvano-cautery applications can be averted by not using the cautery-point at too great a heat, the same being regulated by means of a rheostat. A black-heat often answers for all that is required; a dull red-heat is seldom needed, and by me never exceeded; a bright red-heat is quite unnecessary, and anything like white-heat is to be absolutely avoided as dangerous.

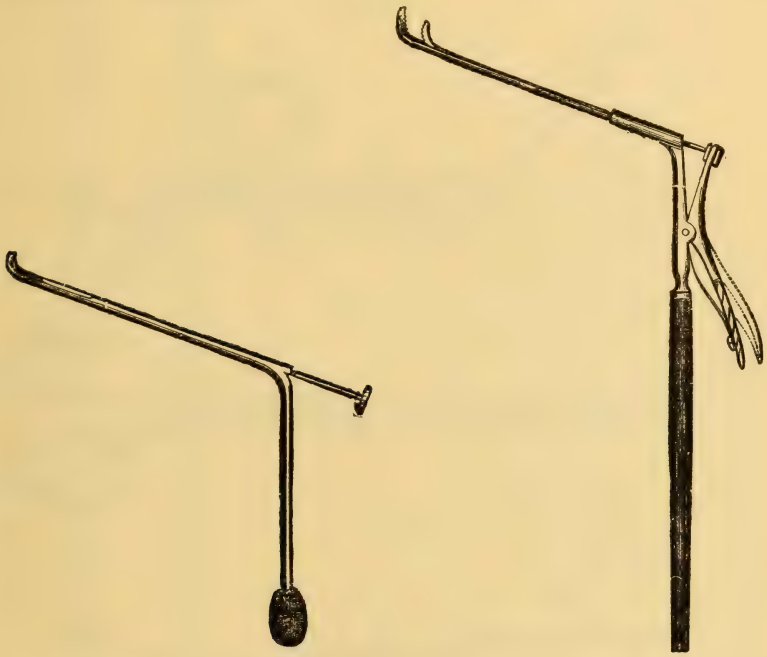


FIG. XCV.—INSTRUMENTS FOR SECURING A NASAL POLYPUS AT ITS BASE PRIOR TO PASSING THE WIRE LOOP AROUND IT (HALF MEASUREMENTS).

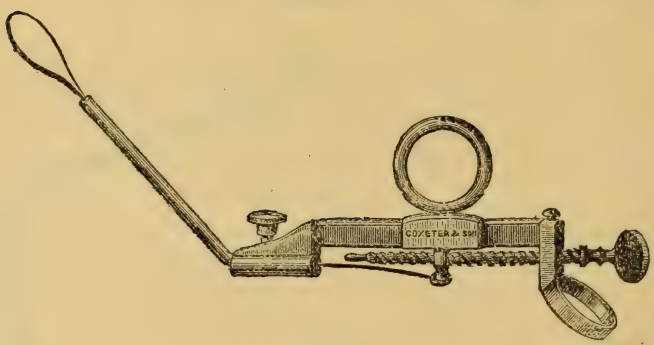
11. The after-pain of galvano-cautery is, in my experience, much less than that following use of a thermal cautery, acid nitrate of mercury, or caustic pastes of soda or potash, in which there is diffusion of the destructive agent beyond the part treated. In some regions—*e.g.*, the nose—the after-pain is often *nil.*

In operations on the nose and ear it is necessary, or at least desirable, to have the passage guarded from the risk of being scorched by the heat of the wire. In aural cases a small ivory speculum answers the purpose; and for the nose, acting on an idea suggested by Mr. Bryant's female urethral dilator, I have

had made by Mr. Krohne an ivory cautery protector which well answers the purpose where the operation is near the orifice.

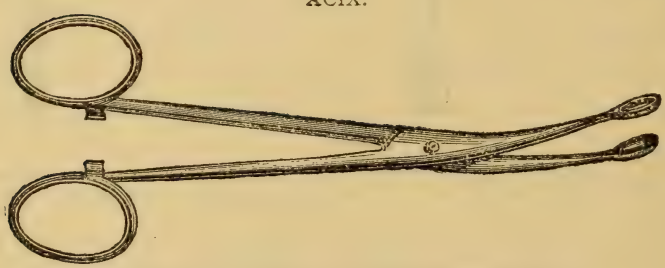
XCVI.

XCVII



XCVIII.

XCIX.



FIGS. XCVI., XCVII., XCVIII., AND XCIX.

Fig. XCVI. Snare for nasal polypus.

Fig. XCVII. Hamilton's ditto, acting either as a slip noose, or by a screw movement as an écraseur.

Figs. XCVIII. and XCIX. Forms of forceps for nasal polypus, each with catches to secure the grip when the instrument is closed. The latter is on the model of an invention of Mr. Lund, each blade consisting of a double cutting-ring.

But this and all other forms of protector are now superseded by my nasal dilator (Fig. L., p. 76), the blades of which are made of ivory. Notwithstanding precautions as to modified heat of the cautère,

non-conducting specula, etc., the accident of an inflammatory otitis may occur. After operations in regions likely to lead to such a contingency, I syringe the nostrils with a warm solution of carbonate of soda (about 5 per cent.), apply oil and cocaine (5 per cent.) on wool to the cauterized surface, and some atropine drops (20 per cent.) to the drumhead by the external meatus.

FIG. CI.—AUTHOR'S IMPROVED RAMONEUR FOR DETECTION, CATCHING, AND WITHDRAWAL OF FOREIGN BODIES FROM THE ŒSOPHAGUS (ONE-THIRD MEASUREMENTS).

The last instrument to be mentioned in this chapter is that for the detecting, catching and withdrawal of foreign bodies from the œsophagus or pharynx. The one I prefer is that known as the 'Ramoneur,' with two modifications—(*a*) that the end (Fig. CI., 1) is of ivory or metal, instead of sponge, for the striking and consequently better detection of coins or other solid foreign body; and (*b*) the addition of two small pins. The first (2), working in a socket, prevents the expansion of the net during introduction; the second (3) enables the surgeon to keep the hair net spread when once drawn up. This arrangement allows him to have much greater delicacy of touch than is possible if he is obliged (as is the case in the instruments usually made) to be continually keeping tension on the piston. For pocket use I have had this instrument hinged at the centre. I am also in the habit of carrying œsophageal bougies of half length, which can be screwed together for use. A long pair of forceps is the best instrument for withdrawal of foreign bodies from the larynx. Voltolini's sponge probang (Fig. LXXXVIII.) is sometimes serviceable. If in the trachea, the windpipe had better be opened at once.

Tracheotomy.—A question will often arise as to the relative merits of early and of late tracheotomy in chronic disease of the upper air passages and, for that matter, the question whether the operation should or should not be performed at all; and it is one which has hitherto rather escaped the attention of writers; though in practice it is naturally, or at least should be, considered in every case that comes under the surgeon's notice. Notwith-

standing that the laryngoscope has now been in use for thirty years, the operation is still for the most part performed on indications—more or less accurate—of urgent dyspnœa, with, to say the least of it, insufficient attention to the physical nature of the obstruction, or to the possibility of relieving it by other than surgical means. The subject is treated in this edition with somewhat more detail, my own attention having been prominently directed to it, as the result of an invitation to open a discussion thereon at an early meeting of the British Laryngological Association. My paper was published in the *Journal for Laryngology*, for April, 1889. As a general and preliminary basis of our consideration, I would venture to announce certain postulates:

(*a*) Tracheotomy is indicated in chronic laryngeal disease (1) on account of urgent dyspnœa caused by an exacerbation of inflammation in the course of a chronic malady; and (2) in certain diseases in which our prognosis points to a progressive, though possibly gradual, increase of respiratory difficulty. In the latter case the operation, if performed early—that is to say, as soon as continued dyspnœa becomes a prominent symptom—is more likely to be both immediately and remotely successful, than if delayed until resulting pulmonary changes have become pronounced.

(*b*) The degree of vital danger which exists in a case of laryngeal and tracheal obstruction depends mainly on the situation of the lesion.

(*c*) Supra-glottic obstruction rarely causes vital risk. For example, inflammation, acute or chronic, unaccompanied, be it premised, by true œdema, and leading to thickening, ulceration, and cicatrisation of the epiglottis, ary-epiglottic folds, or of the ventricular bands, is not often accompanied by urgent dyspnœa, and this is indifferently true, whether the case be one of phthisis, lupus, or syphilis. I have made an exception with regard to true œdema, not such as exists in phthisis, which is in no sense of that nature, because I am of opinion, with Sestier and Morell Mackenzie, that not only is œdema of the larynx much more rare than is generally supposed in Bright's disease—Mackenzie did not find it once in 200 cases—or in general anasarca, but also 'that the intervention of a phlegmasia of the pharynx and larynx, or neighbouring tissues, is nearly always necessary.' I would go further, and express my belief that neither in the case of such an acute œdema, accompanied as it is by a general phlegmasia, usually the result of a septicæmia, nor in that of one occurring in the course of a chronic syphilitic laryngitis, and causing difficulty

of breathing, is the œdema often limited to supra-glottic regions, but that that most dangerous of all situations, the portion immediately below the glottis, is almost invariably involved, and that this is proved subjectively, even where not visible, by the character of the dyspnœa.

An exception in some sense has also to be made to this proposition in regard to cancer, in which the disease, although it be apparently situated at a spot not interfering with the glottic patency, may, by extension into the deeper tissues, produce an obstruction which is to all clinical intents and purposes of the nature of a neurosis—that is to say, it is due to a paralysis of intrinsic respiratory muscles.

(*d*) Obstruction of the lumen of the glottis itself—by which I mean of that space bounded by the vocal cords—may be considerable without producing vital dyspnœa. Examples of the truth of this statement are frequently afforded in the case of benign neoplasms, when attached by broad bases to the superior surface or free edge of the vocal cords. The circumstance of this absence of respiratory difficulty is indeed of high diagnostic import in regard to their benign character.

A like, though not so complete, an immunity is also observed in cases of congenital or cicatricial webs of the vocal cords where there is no implication of other contiguous structure.

(*e*) Sub-glottic obstruction, whatever the cause, is always attended with the gravest danger to life, and it can be further postulated that the lower the situation of the obstruction in the windpipe, the greater is the risk; and also the less is the chance of relief being afforded by an artificial opening.

(*f*) It is not unimportant to premise—though less so than it was twenty years ago—that no tracheotomy ought to be advised, much less performed, on account of chronic—it might indeed be said any—laryngeal disease without a thorough preliminary investigation with the laryngoscope, and further, that the same means of information should be practised before a tracheotomy tube is removed.

One of the first cases of tracheotomy in my independent hospital experience illustrated the necessity for enforcing this precaution, as well as the unwisdom of neglecting it. It occurred to me in 1874, in the person of a gentleman's servant, who had been tracheotomised by the house surgeon of a hospital boasting a special throat department, which was presided over by both a physician and surgeon. Not only was no laryngoscopic examination made prior to the opening of the windpipe—that might well have occurred—but the tube was removed after eleven weeks, and the patient discharged without such a step having been taken. The man came under my hands less than six months later, and was found to be the subject of serious stenosis, due to syphilis. It was urgently necessary to repeat the operation, and though I had the opportunity of seeing the patient for many years afterwards, I was never able to advise withdrawal of the tube.

As further illustrations, one has only to look through the morbid specimens in our various museums to see how many cases there were in pre-laryngoscopic days in which tracheotomy was unnecessarily performed, and to recall as one—doubtless of many similar—the case under the care of Liston, quoted by Solis-Cohen, in which a stenosis, having been successfully dilated through the tracheotomy wound from below, the tube was withdrawn, but had to be re-inserted on the following day.

It is fair, therefore, to make this postulate, that while the more expert the laryngologist, both in diagnosis and therapeusis, the less frequent will be tracheotomy in his practice; so also the less liable will the patient be to suffer from either a too early withdrawal or a too prolonged retention of the tube.

I have no intention of entering into any detailed description of the operation, but would simply say that, except for cases of urgency, and in which the tube will not be required for more than a few days, I never perform or advise *laryngotomy*—that is, introduction of the tube through the crico-thyroid space. Such an operation is virtually never indicated in chronic disease and seldom in acute maladies. Nor do I, if possible, ever make an opening that does not leave the first ring of the trachea undivided—for division of, or pressure of the tube on the cricoid cartilage, is very likely indeed to be followed by caries of that structure and other complications. Such a limit in my practice represents the *high* operation, while by the *low* operation I intend to convey one in which the trachea is opened below the inferior boundary of the third ring.

With regard to tubes, without doubt the rectangular tube of Durham carries the palm for all cases in which the instrument has to be worn for any length of time, and is also the best in the first instance where one has plenty of assistants. But, though the old bi-valve tube of Fuller has been very uncompromisingly condemned of recent years, the ease with which it can be introduced where hands to hold retractors and the assistance of dilators are not available, renders this instrument a very serviceable one to the country operator for first use in cases of emergency. Whatever tube is employed, I endeavour to leave it unchanged for forty-eight hours, and then insert the one which is to be retained for the whole length of time of its use.

Further remarks regarding other operative procedures on the larynx may be deferred till consideration of the treatment of the various diseases in which they are required.

Anæsthetics.—Of local methods cocaine stands first, and to the

use of this drug I have already alluded more than once. For operations on the pharynx and larynx I employ a spray, and find that anæsthesia is generally sufficiently pronounced to commence operating in from five to seven minutes. Sometimes, as in the case of lingual varix, or in hypertrophy of the lingual tonsil—the solution may require to be 'rubbed in,' this may be done by means of a brush. It should not be forgotten, especially in operations on the young, that the amount of cocaine administered by a spray may be enough to produce serious toxæmic effects, and indeed, at least one fatal case due to this cause has, to my knowledge occurred. For the relief of after-pain of operations such as tonsillotomy and uvulotomy, I employ a soft lozenge containing a tenth of a grain of cocaine in each.

For intra-nasal procedures I apply a solution on pledgets of cotton wool, which should be retained from ten to fifteen minutes. It is often necessary to use a solution of a greater strength than ten per cent.; but occasionally for the more painful intra-nasal operations, such as those involving the use of the trephine saw or cautery, it may be well to add a little of the solid salt on the moistened wool which is to be retained within the nostrils for about three minutes before commencing to operate.

For some external operations, such as removal of glands in the neighbourhood of the neck, hypodermic injection of cocaine is very efficient. Even for tracheotomy, five to ten minims of a ten per cent. solution injected on each side of the immediate region at which the trachea is to be opened, will produce nearly complete insensibility of the skin. Ten to twelve minutes should be allowed to elapse before commencing an operation, and in the majority of instances pain will not be felt even from the first incision through the skin. Local anæsthesia can thus be maintained sufficiently long to allow of a careful and leisurely performance of the operation. Beyond the advantages of cocaine as a local anæsthetic, this remedy so applied has the effect of depriving the part of blood, and thereby diminishing hæmorrhage during the operation, whereas with chloroform and ether the contrary effect is often produced. It also quiets the breathing and steadies the larynx in cases in which respiration is seriously hurried.

It is necessary to repeat the caution which I have already published (*British Medical Journal*, April 27th and June 1st, 1889) against allowing patients to use cocaine indiscriminately for relief of quite slight symptoms of chronic conditions. This is a dangerous procedure, for the twofold reason (1) that the drug loses even its analgesic action after long use, as is exemplified in the

diminished relief it affords, after a time, to dysphagia occasioned by tuberculous or other ulceration—the most justifiable indication for its continuous employment. (2) While cocaine, in the first instance, promotes salivary and mucous secretion, it is found that patients who long indulge in applications of this drug suffer later from abnormal dryness of the throat. Further, its good effect in temporarily relieving capillary engorgements of the turbinated bodies, etc., results, if its use is unduly prolonged, in either an anæmia with atrophy, or a no less inconvenient increase in the intensity and chronicity of the hyperæmia. I have seen two cases in which I believe anosmia to have been induced, or at least aggravated from this habit. Tetanic spasms have also been noticed as an effect of long use of this drug. Needless to add that the amount of cocaine absorbed into the system has an injurious general effect on the health in the shape of a debilitated vaso-motor system ; this is accompanied by aprosexia, loss of memory, want of decision, hypochondriasis and depression of energy, spirits and intellectual powers.

Where deep general narcosis is required and the operation is short, nitrous oxide will be sufficient. In other cases I am in the habit of commencing with nitrous oxide and continuing with ether. A disadvantage of the last-named drug is its disposition to increase salivary secretion and vascular turgescence, in these respects being inferior to chloroform, which, however, has certain disadvantages of vital risk of much more importance.

Dietetics and Hygiene. — A chapter on the therapeutics of throat diseases would be incomplete without some remarks respecting the dietetic and hygienic measures necessary for the treatment and prophylaxis of those affections. With respect to such directions, it must be remembered that in throat affections three distinct functions are interfered with, viz., deglutition, respiration, and vocalization. The principal difficulty in their treatment lies in the impossibility of giving them perfect rest, two of them at least being vital functions. The great object, however, must be to give each as little work to do as possible.

Deglutitory.—In all cases of relaxation and congestion of pharyngeal mucous membrane, every form of pepper, spices, and hot condiments should be avoided.

Ice will often be found most grateful to the throat, but, in order to avoid injury to the digestion, it should always be taken mid-way between meals, and not just before one.

Special dietary rules are called for in those cases in which the

constitutional foundation of the local ailment is an essential feature for treatment. Recognising the lithic acid diathesis as a predisponent of a majority of throat diseases in the pharyngeal—or more correctly faucial—region, I am particular to caution against those articles of food, both solid and fluid, likely to favour fermentative dyspepsia. Further details on this head are not necessary in this place.

Soft food is often absolutely necessary in throat affections, and it is also frequently essential that such food should be given in the most concentrated form, in order to give the deglutitory function as little work as possible. Extracts made from fresh meat are, in my judgment, preferable to the concentrated preparations, such as Liebig's. A very excellent form for the administration of nourishment, and one which can be employed even in very considerable obstruction of the gullet, consists of a raw egg broken into a cup, seasoned with a little salt and vinegar, and swallowed whole like an oyster. The yelk generally breaks at the moment of swallowing, and thus forms an agreeable and soothing emollient application to the throat, at the same time that it is a valuable and easily digested nutriment. An egg can frequently be swallowed in this way, when it would be rejected if taken beaten up, and spoilt by the admixture of wine or milk. In cases where there is a return through the nose of fluids taken, drinks should be thickened with arrowroot, isinglass, or Iceland moss, and the patient should be directed to take them in gulps rather than in sips.

In those cases where, in consequence of pyloric obstruction, food is returned after a greater or lesser period of time, much benefit may be derived by predigestion of the food, by means of peptonizing powders or pancreatic extract. The casein of the milk or the albuminous constituents of beef-tea are thus easily converted into peptones, and absorption in the stomach is thereby greatly facilitated, while the more irritating fermentative processes are held in check. It is important to remember that food when pancreatized is apt to quickly putrefy.

Artificial Feeding.—Whenever the function of swallowing is so impaired that artificial nutrition is necessary, it is desirable, if possible, that such feeding should be administered through the stomach by means of an œsophageal tube rather than *per rectum*. The instrument most recently introduced, and known, I think, as Krishaber's, is an immense improvement on the really formidable weapon usually supplied with a stomach pump. When œsophageal feeding is adopted, food need not be given oftener than

twice, or at most thrice, in the twenty-four hours. The same may be said of rectal enemata. Food so administered should be pancreatized, and should not be given in too concentrated a form. There can be no doubt that much harm is done by the practice of giving essences of beef or milk stronger than the intention of the manufacturers. In our experience two eggs, with six or eight ounces of good beef-tea, and possibly a little brandy, as well as any medicament necessary for the case, administered twice or at most thrice daily, constitute an all-efficient diet for artificial nutrition. The food should be given at a temperature of 90° to 100° Fahr.

When the obstruction is so situated as to offer an effectual barrier to the introduction of food into the stomach, it may become necessary to consider the advisability of surgical intervention with a view of preventing a painful and lingering death by starvation. For the details of these operations the reader must refer to treatises on surgery.

Respiratory.—Sudden changes of temperature are always hurtful to the respiratory passages. Draughts of air striking against the throat externally, or a very sudden change of breathing atmosphere, particularly if just after use of the voice, are prone to set up congestion of the larynx. A cold, damp atmosphere is the worst, whereas dry winds, even if cold, are often beneficial rather than harmful, as the experience of those who have tried the Davos-platz in the Engadine proves. Warm, damp south-west winds, though agreeable in laryngeal catarrh, are often hurtful to the pharyngeal relaxation, which induces, accompanies, and keeps up the laryngeal disease. The effect of damp on the discomforts experienced by polypus, and by many other diseases of the nose, is well known.

Our great object in advising a patient on climate must be to change the particular atmosphere which is most obnoxious. If cold, damp air is hurtful, warm and dry inhalations are indicated, and a corresponding change of residence. My own opinion of the winter health-resorts of England is not a favourable one, and I believe that if the patient cannot winter at his own home with home comforts, or in London, which is warmer, drier, and better drained than any small town can be, he had better go out of England altogether. As has just been said, all sudden changes are most injurious, and it does not much matter whether the change be from a dwelling-house, theatre, church, or ball-room. [In a ball-room there is superadded to the change of temperature the danger of inhaling dust and actual mineral particles from

dresses, artificial flowers, etc. Many patients complain of throat-trouble only after exposure to this influence.] With regard to change of clothing, it is by no means always necessary for the patient to swathe himself in flannel; but he should make a difference, even though it be a slight one, according to the atmosphere, as far as clothing is concerned. There is no country where such common-sense precautions are less heeded than in England, and none where they are more necessary. In Russia, and other cold countries, all outdoor clothing is removed the moment the wearer enters a building. These remarks are equally applicable to the reverse practice of wearing too heavy clothing in hot weather.

Respirators are often of considerable value as preventives against cold from change of temperature, and are useful in most cases where the inhalation of unmitigated atmosphere causes irritation of the throat. When a patient is able to breathe entirely through the nostrils, a respirator is of but little use, as Nature has provided in the nasal passages an efficient respirator for herself, by which the air is warmed and deprived of its noxious properties before it reaches the throat. A great deal of respiration is, however, necessarily carried on through the mouth, especially during conversation, and it is under such circumstances that the use of a respirator will be found especially grateful and valuable. The principal conditions in which the respirator is useful were well pointed out in a leading article in the *British Medical Journal*, March 3rd, 1877, in which the following remarks occur: 'In fogs the black carbonaceous particles are most irritant to the lining membrane of the air-tubes, and a secretion of mucus is Nature's method of sheathing the tender membrane against these irritant particles. Many of them are caught on the sides of the nasal air-passages, while others become entangled in the mucus of the bronchi and bronchiæ, as is evidenced by the black colour of the expectorated phlegm. In such fogs many of those who do not resort to respirators will be found with their handkerchiefs over their mouths, converting that useful article into a makeshift respirator. The particles are largely intercepted by the respirator *in transitu*, and still more if the respiration be carried on through it chiefly, and but to a small extent through the nostrils. . . . . The respirator is exceedingly useful, too, under the following circumstances. In cold winds—especially when facing them—the cold air finds its way into the mouth at every opportunity, and so communicating with the air respired, or with the residual air in

the thorax, lowers its temperature, and then hyperæmia of the lining membrane of the air-tubes is produced. The respirator will be found a great preservative under such circumstances, and will prevent many a cold, sore throat, and hoarseness. In driving in cold weather it will be found to be very comfortable at the time, and desirable in its protecting power against unpleasant after-effects; also in walking out with companions, when talking is necessitated, the respirator will be found very agreeable by those who find cold air so breathed to produce disturbance in the respiratory apparatus.'

Of the use of the respirator in chronic laryngitis, Solis Cohen thus speaks: 'Where the patient is exposed to the inhalation of irritant gases or vapours, or solid particles floating in the air, he should wear a respirator at the time, or cover the nostrils and mouth with a veil, or keep the mouth closed and protect the nostrils by a tiny wad of cotton, just delicate enough not to interfere with respiration. In some cases attended with frequent cough, the respirator or its substitute should be in constant requisition to modify the effect of the oxygen of the air, which is sometimes too irritating for the over-sensitive mucous membrane. The value of the respirator in these cases cannot be appreciated by those who have not witnessed its beneficial effects for themselves.'

But while respirators are doubtless of service to many persons, especially females, in modifying the quality and temperature of the respired air, they are not without some disadvantages. They encourage the habit of breathing by the mouth in preference to the nostrils, the result of which at night is a liability to snore and the production of a dry mouth and fauces, and a furred tongue; while, during the day-time, Nature's contrivance for warming and moistening the air in passing through the narrow, winding passages of the nostrils is rendered nugatory.

Then again, the very susceptibility of the mucous membrane, to mitigate which they were devised, is apt to be increased by the unnatural and unnecessary warmth of the air engendered by these instruments, and by the liability to take cold thereby augmented.

Finally, a certain admixture of the expired with the inspired air takes place, analogous to that which takes place in an imperfectly ventilated room.

To overcome this, an oro-nasal respirator has been invented, but it is very unsightly. Less objectionable, and often very serviceable, is a simple cloud of Shetland wool worn over mouth and nose.

The drawback of unsightliness already mentioned, and one of great weight with ladies, as also the other objections to the ordinary respirator, are overcome in a considerable degree by the 'respirator-veil,' which was suggested, described, and figured by me in the *British Medical Journal*, Nov. 18th, 1876; it consists of an ordinary piece of blonde, about twelve inches deep, over the lower four inches of which is sewn a double thickness of silk gossamer. By wearing this as a veil, mouth, nostrils, and ears are equally and sufficiently protected from cold, the external atmosphere being warmed in the chambers formed by the layers of gossamer. To prevent the veil from becoming unpleasantly damp by the moisture of the breath, that part which comes over the nose and mouth may be stiffened by a layer of wire-gauze, so as to stand away from the face, and it may be prevented from blowing up by a piece of elastic braid threaded through the lower hem. The so-called 'invisible' respirators are of little value, except for compelling nasal respiration. A very ingenious adaptation of the respirator to remedial purposes has been described by Sir W. Roberts, of Manchester, under the name of the 'respirator inhaler.' In appearance it much resembles the ordinary respirator, but it may be impregnated with medicaments, so that the wearer is constantly inhaling a medicated atmosphere. The unsightliness of the ordinary respirator has been somewhat modified by Messrs. Maw, who, instead of the ugly and conspicuous black cover usually adopted, now make some of their respirators with drab cloth, which renders the instrument, especially if worn under a thin veil, almost imperceptible, or at least less unsightly.

Vocal.—It is frequently necessary to give the vocal organs rest, and even entirely to prohibit the use of the voice, especially in the case of those patients who have to exercise it professionally. This, however, is not universally the case. It would appear, for instance, that reading aloud, and talking in rattling vehicles, or in noise of any kind, is more injurious to the voice than public speaking. Such practices should therefore be strictly forbidden. Again, many singers complain of diminished range, both in their lower and higher notes, without there being any perceptible impairment of the middle register. In these circumstances directions for the modified use of the voice are indicated, and particular attention is required in order to ascertain whether the defect in the voice may not be due to faulty voice production. This subject having been elsewhere treated at some length, it is not necessary here to do more than refer to it.

Where there is spasmodic vocal enunciation, or where there is the slightest ulceration or abrasion of the vocal portion of the larynx, absolute silence must for a time be enjoined.

Baineo-Therapeutics.—The benefit to be derived from treatment of disease by the aid of natural waters is by no means so highly appreciated by practitioners in England as abroad. One reason for this incredulity may doubtless be found in the fact that, while, perhaps, too much is claimed for hydrotherapeutics by our Continental *confrères*, the results of treatment by those springs which we possess in England have not so far encouraged practitioners to extend their experience. Within the last few years, however, great advance has been made in this branch of treatment, and it is proved beyond doubt that the action of natural mineral waters does not depend solely, or even to any great extent, on the amount, often very small, of active ingredient which they contain, but is the result of their natural chemical combination, and of their thermal properties. It is this last principle of a natural high temperature that is to be found in almost every water of any value for bath treatment, especially of those suited to diseases of the larynx. In all the effect is produced not only, and often not at all, by their local action, but by their eliminative action on the skin, the kidneys, liver, etc. Moreover, as regards the throat, the circumstance that 'spa cures' are for the most part undertaken in the summer is not to be ignored as an important adjuvant of the therapeutic value of the particular spring selected. For the same reason this treatment is unattainable at that season of the year when the patient is most likely to require relief for acute exacerbations, the establishments being almost universally closed in the winter months; and in this respect the waters of Bath possess unique advantages over Continental sources, though it is possible that, in some cases, exposure of the bather to inclement weather may in turn negative, or at least go far to discount, the benefit which, *per se*, the waters are capable of effecting. An unsigned article in the *Journal of Laryngology* for November, 1887, gives in a few pages very full information on those springs best adapted to diseases of the throat and nose. They may be broadly classified as follows: (1) The **Sulphurous**, containing free H_2S, and combinations of sodic and calcic sulphides. It is doubtful whether sulphur-baths have any action other than that of perfectly indifferent thermæ. The effect of sulphuretted water as sprays is hardly more potent than the baths—they are rather sedative when so employed. But sulphur waters taken internally have a powerful effect in reducing

hepatic engorgements, and congestive conditions of the gastro-intestinal tracts, and also for catarrhal conditions of mucous membranes, particularly the respiratory. Of sulphur-springs, those chiefly to be recommended are Aix-les-Bains, Luchon, and Cauterets for bathing, Challes for drinking, and Marlioz for spray inhalations. Both Challes and Marlioz are situated very near to Aix-les-Bains—which is also to be recommended by preference, on account of the great abundance of the supply of water (one million gallons per day), and for perfection of every detail of the bath establishment. The waters of Bath have many points of similarity to those of Aix-les-Bains—are very abundant, and are administered in great perfection. Every detail of treatment as pursued at Aix is to be found here, even to the employment of *masseurs* and *masseuses* from Savoy. (2) The **Saline**, characterised chiefly by the presence of sulphates and chlorates. Those rich in chlorides are the most valuable for throat and pulmonary complaints, and can be employed either as 'brine baths,' or internally as potions. Soden, in Germany, has a high repute, but of it I have no personal experience. Mont Dore, Royat, Aix, Wiesbaden, and Homburg have each a high reputation. At Mont Dore, and more especially at Bourboule, close to it, much of the benefit derived is due to the **arsenic** contained in the waters, which are of service in cases of granular pharyngitis, enlargements of the bronchial glands, and in some forms of asthma. At Kreuznach, Challes, and also at Woodhall Spa in Lincolnshire, the waters are strongly impregnated with **bromo-iodine**, and are indicated in cases of scrofulous enlargement of the lymphatic glands, and in goitrous and other tumours. The waters which contain **iron** are legion, and cannot here be enumerated. Of **simple alkaline** waters, Ems is by far the most generally serviceable.

CHAPTER VIII.

THE GENERAL ETIOLOGY AND PATHOLOGY OF THROAT DISEASES.

It may be generally accepted that the throat is liable to become the seat of any pathological change peculiar to the many and varied structures which make up its component parts. Every known morbid process of cartilage, mucous membrane, submucous and glandular tissue, arteries, nerves, or muscles, singly or together, may be observed in the larynx or pharynx.

To quote [1]Cohen: 'Inflammations, idiopathic, deuteropathic and traumatic, occur in various grades, or occur as constituent manifestations or results of systemic affections, such as tuberculosis, scrofulosis, syphilis, cancer, rheumatism, gout, erysipelas and the exanthemata, continued fevers, diseases of the large glands, chronic cutaneous affections, and other maladies. Then we encounter the various products of inflammation—adhesions of tissues, fistulæ, strictures, glandular enlargements, tumours benign and malignant, aneurisms, etc.; likewise wounds and other local injuries, mechanical and chemical; foreign bodies, introduced by accident or design; local results, such as œdema, pustular inflammation and destructive ulceration from the use of certain drugs, ... and finally, various disorders of nervous origin.'

It is not, of course, intended to discuss in this chapter the causation and pathological nature of all throat diseases, but only to draw attention to some main facts which underlie the general question of diseases—and especially of inflammation in the rhino-pharyngo-laryngeal tract.

Many influences combine to intensify or to modify diseases of the throat, and so complex are they that it is quite impossible in a general consideration of the subject to entirely separate them by any regular method. For example, disorders of respiration may arise from causes which will also influence, in a more or less marked degree, the functions of deglutition and vocalization; or

each of all these processes may be impaired separately and without any effect on the other. In certain circumstances the pharynx, or some portion of it, may be primarily attacked, in others the larynx. In one person a pharyngeal disease may extend upwards towards the nares, in another downwards to the larynx. Similarly the local manifestations of systemic diseases may be exhibited in quite different parts of the throat, and it is difficult always to assign causes for these varied peculiarities. Without continuing to generalize, it may be said that from whatever point of view we consider the causation and character of throat diseases—the **anatomical**, the **functional**, or the **hygienic**—we shall encounter these difficulties, and an attempt to clear our ground of some of them before entering into examination of each individual throat disease, can only be successful if we acknowledge at starting that we must not restrict ourselves to any one aspect of the task.

In any general summary of the etiology and pathology of morbid conditions of this region, we have necessarily to take into account:

1. The secretory and absorbent processes of the throat, including (*a*) the nature of the secretions in health and in diseased states; and (*b*) the character of the fluids absorbed, both normal and pathological.
2. The respiratory functions of the various parts of the throat (*a*) in health, and (*b*) as modified abnormally by structural changes or circumstance, *e.g.*, insanitary surroundings, etc.
3. The throat, as part of the alimentary tract.
4. The throat in relation to voice-production.
5. The pathological results of the above departures from normal function.

Before even endeavouring to throw into relief the more obvious factors which obtain in the commonest forms of throat disease it is necessary to anticipate somewhat, and to draw attention to the connection between morbid conditions of the throat and those of the nose. If the nose be obstructed, its important respiratory functions of warming, moistening, and filtering the air, have to be carried on under disadvantageous circumstances by the mouth, pharynx, and larynx, and a departure from the healthy condition of these parts, in relation to all the functions just enumerated, ensues sooner or later; for it is now all but universally recognised that a majority of diseases of the pharynx, larynx, and tympanum are directly related to obstructive disorders of the nose. Nasal stenosis, whatever its cause, leads to mouth-breathing, with its

attendant evils; and in not a few instances of pharyngitis and laryngitis the sole indication for treatment is to remedy the nasal obstruction. Much literature has lately appeared on this important subject of mouth-breathing, the most recent and valuable being the monograph of [2]Bloch, the pupil and successor of the lamented Häck.

Of equal importance, almost, in the etiology of throat diseases, stands the character of the nasal and buccal secretions. So long as the nasal respiratory channels are normal and the secretions from the nose, mouth and throat healthy, so long will the individual be likely to escape ordinary throat troubles. It is necessary to bear in mind that the nasal and oral fluids are continually being contaminated extrinsically by the entrance of germs and irritants in the air, and intrinsically in diathetic states of the system.

It has to be remembered that the throat is lined by a mucous membrane which is both highly secretory and absorptive; and it is probable that in health the secretory function is of far more importance to the organism than the absorptive. Attention has already been called to the two kinds of glands of the throat, the acinous and the lymphoid: the former are concerned principally with the secretion of a lubricating substance—mucus—and they are, therefore, pretty widely disseminated over the whole mucous lining. The function, however, of the lymphoid glandular tissues has been long a matter of speculation and conjecture, though their great development in this region, and especially in the pharynx, has evidently pointed to some very important duty. We have already alluded to these lymphoid glands, which, when aggregated, are known as **tonsils**, a term until recently restricted to the **faucial** lymphoid masses, but now applied to the aggregations of adenoid tissue in the roof of the naso-pharynx, at the Eustachian orifices, at the base of the tongue, in the soft palate, and in the ventricle of the larynx, and known respectively as the **pharyngeal**, **tubal**, **lingual**, **palatal** and **laryngeal tonsils.** Moreover, the disseminated lymphoid follicles at the back of the oro-pharynx have been named the **discrete** tonsil; this nomenclature is doubtless open to criticism, but is now so generally adopted by specialists at home and abroad, that no apology is necessary for taking advantage of it on the ground of convenience. Although the importance of these lymphoid glandular structures has been recognised on anatomical and clinical grounds, it is only during the last few years that the question of their function has been seriously treated. The older writers vaguely regarded the tonsils as having some lubricating function. In more recent times they

have been rightly referred to the lymphatic system, because of their obvious structural resemblance to the ordinary lymphatic glands. Their *raison d'être* on the walls of the alimentary and respiratory tracts, however, still remained unexplained; it had always appeared evident to me that their situation indicated some function added to that of their prototype—the leucocyte manufacturing lymphatic gland. In the second edition of this work I called attention to the speculations of [3] Hingston Fox, who endeavoured to show that the tonsils were absorptive in function, he arguing from the observed fact that inflammatory conditions of the tonsils are nearly always in relation with abnormal states of the buccal fluids. Recognising the importance of obtaining more definite information as to the rôle of the tonsillar tissues, I, in 1886, suggested to my former pupil, Mr. William Hill, the advisability of utilizing the opportunities afforded by the Throat and Ear Hospital for the purpose of settling some disputed points. As the result of these investigations, [4] Hill finds that the tonsils, whilst receiving the products of absorption through the lymphatics of the neighbouring mucous membrane, and perhaps directly absorbing by their epithelial covering, are in the main manufacturers and secretors of leucocytes. The crypts, when present, which, according to Fox, facilitate absorption, are, it is contended, more allied to ducts, being 'reservoirs' for leucocytes, which migrate through the mucous membrane, by diapedesis, into them from the lymphoid saccules, or follicles. On this view the lining of the nose and throat, whilst highly absorbent, like any other mucous surface, possesses two distinct sets of secretions and secretory mechanisms, viz., the acinous glands which secrete a mucous lubricating fluid, and the lymphoid (tonsillar) glands, which secrete lymph. The leucocytes in the latter fluid probably act as 'scavengers,' devouring germs, small particles of food, etc., and possibly playing also some important rôle in amyolitic digestion. Fox's views as to the connection between lymphoid inflammations in the throat, and contaminated condition of the nasal and oral fluids are confirmed.

[5] Retterer, as the result of elaborate researches into the development and structure of the tonsils, has come to the conclusion that they are secreting glands; but he has fallen into the error of stating that they have no ducts, and therefore conjectures that the products of secretion pass only to the blood system. He has curiously missed the point that the crypts are potential ducts, and that leucocyte secretion is by diapedesis through the mucous covering into the cryptic diverticula.

These views being conceded, it is evident that nasal obstruction, as leading to mouth-breathing, is an important factor in the production of unhealthy states of the buccal secretions, and that irritating products in these fluids, interfering with the proper performance of function of the lymph-secreting follicular glands, are a fruitful source of disease.

As regards the etiology of faucial and naso-pharyngeal lymphoid inflammation, [6] Hill has shown it to be, for instance, a fact that most forms are associated with either (*a*) *extrinsic*, usually septic, microbic influences, which contaminate the contents of the oral cavity, or (*b*) with *intrinsic* influences, usually associated with some diathetic state in which the buccal secretions contain abnormal irritating products. Amongst the oral contaminations of an extrinsic character may be mentioned impure food, water, and especially impure air, dependent on insanitary surroundings, and particularly to the presence of micro-organisms of a pathogenic or quasi-pathogenic character. Mycosis tonsillaris, and the tonsillitis of scarlet fever, diphtheria, etc., may be instanced as evidently of extrinsic origin.

'Again, the chronic hypertrophic inflammatory conditions of the pharynx met with in individuals the subjects of the strumous diathesis and of syphilis are examples of intrinsic contaminations of the buccal secretions. In many instances of pharyngitis, however, we find, that to an intrinsic, often chronic diathetic predisposition to inflammation, there is often added an exciting factor, like cold or wet, which induces catarrh, and appears to be necessary to, or at all events to greatly favour, the growth and action of such extrinsic excitants as micro-organisms. Most forms of tonsillitis and pharyngitis appear to be readily explicable on one or other of these heads. . . .

'The oral and pharyngeal tracts appear to afford an excellent culture-ground for micro-organisms. It is true that most of these under healthy conditions are of an innocent character; it has been proved, however, that under certain conditions, a group consisting of distinctly pathogenic organisms inhabit and develop in these cavities in diseased states only; and further, recent researches seem to have established it beyond doubt, that members of an intermediate group are occasionally, if not frequently, present in the saliva of apparently healthy individuals. The characteristics of this latter group would appear to be that they lie dormant, or, at all events, lead a comparatively harmless existence so long as the individual is in good general health, but when the health of the human organism is below "par" from

various causes, these microbes suddenly burst into activity, resulting in increased growth, reproduction, and the formation of ferments and chemical poisons. The morbid results are, however, as variable as the several conditions which favour the development of pathogenic characteristics. The presence of this group of organisms, whose life-processes are at one time benignant, and at another time malignant, in the sense of being inimical to the healthy condition of the mouth and throat, and to the individual generally, has only in recent years been fully realized. In this group, members of which may, in small numbers, inhabit the healthy mouth, must be included leptothrix buccalis, which under certain circumstances appears to produce mycosis tonsillaris and so-called follicular pharyngitis; also the diplococcus of Fränkel, and the pneumococcus of Friedlander, which seem to be so intimately associated with febrile pneumonic conditions; also staphylococcus albus and aureus, and streptococcus pyogenes, which are general concomitants of suppurating processes in the mouth and elsewhere. The statement that diplococci and pneumococci are sometimes present in healthy saliva is made on the authority of Netter, but it is possible that these organisms are only to be found in individuals exhibiting some deviation from the normal, as, for instance, in catarrhal subjects. The catarrhal condition is a sufficient deviation of the mouth and throat from the normal as to constitute a culture-ground for these organisms, and in such a case it would be incorrect to assume the saliva to be perfectly healthy. It is probable that a number of quasi-pathogenic organisms inhabit the mouth and throat of those human subjects who exhibit some slight deviation from the normal as regards the buccal fluids, and that under certain suitable, but as yet ill-understood conditions, the growth and life-processes of these organisms may be the starting point of many inflammatory conditions of the mouth and throat, as dental abscess and caries, various forms of tonsillitis and pharyngitis, and possibly by extension to the pulmonary and alimentary tract, of morbid conditions in those areas. Furthermore, the life-processes of oral and pharyngeal colonies of such microbes may be the starting-point of zymotic febrile diseases, as for instance in scarlet-fever, measles, or small-pox, in which probably the germs, together with their poisonous chemical excreta, consequently gain access to the blood-system, or, as in diphtheria, where the chemical poison alone enters the system, the germinating organisms remaining on the false membrane.

'Mention has been made of the chemical life-processes of micro-organisms. There have been identified and cultivated from the

human mouth between 50 and 100 different micro-organisms, a third of which have been considered of a pathogenic or quasi-pathogenic character. Unfortunately the pathogenic nature of many of them has been inferred from the morbid effects produced on rabbits, mice, and other small animals injected with the bacteria-adulterated saliva, and the fact that in many instances the blood and tissues of these inoculated animals swarmed with the same organisms which the salivary injection contained, has been held to prove the pathogenic nature of the organism in question. Such a test, however, scarcely establishes the pathogenic nature of a microbe in relation to the human subject, which is *the* point of practical importance; and, moreover, the fact that small animals often die after injection with morbid salivary secretions without the reproduction of the organism supposed to be pathogenic, although held to prove that the microbic life-processes have produced a chemical poison (ptomaine, albumin, albumose, or what not) inimical to the life of the animal experimented upon, by no means necessarily leads to the inference that the poison is of any pathogenic importance, as regards the human organism, when present in the buccal fluids. Indeed, our knowledge of the part played by bacteria in the human mouth, throat, and alimentary tract, though increasing, is still very imperfect. The subject has hitherto received far more attention from the scientific dentist than from the medical pathologist.

'As is well known, one or two oral bacteria possess the power of converting starch into sugar; the majority are able to invert cane-sugar into levulose and dextrose, and a large number possess the power of changing sugar into lactic acid. ($C_6H_{12}O_6$ grape sugar = $2C_3H_6O_3$ lactic acid.)

'Carbonic dioxide, hydrogen, formic, butylic, and acetic acids are also formed in the mouth by bacterial action. Of all these chemical processes it is probable that the production of lactic acid is of chief pathological and etiological importance. Dental surgeons believe that these acid contaminations of the buccal cavity of bacterial origin, and especially the lactic acids, bring about decalcification of the teeth, and the animal part of the dental framework is afterwards dissolved by virtue of the peptonizing power which certain buccal and other micro-organisms are known to possess. We know something also of the habits and methods of acute pathogenic bacteria in the mouth and throat. Many of them produce an enzyme or ferment which acts on the surrounding organic media, producing numerous poisons. Our

knowledge here again is, however, very imperfect. It has been proved, for instance, in the case of pharyngo-laryngeal diphtheria, a specific bacterial disease, that the ferment by its action produces in the surrounding media a highly poisonous albumin, which when injected into an animal will produce the characteristic symptoms of paralysis, syncope, etc. Under some conditions pathogenic organisms are capable of forming poisonous alkaloidal bodies or ptomaines, besides virulent albumins, albumoses, and acids. Apart from Gautier's researches, these substances have not been looked for to any extent in the mouth and pharynx under diseased conditions. This will doubtless in the near future form a fertile field for microbic and chemical investigation.'

Associated with most disorders of the throat, we get either excessive or diminished capillary circulation—hyperæmia, or anæmia—with a tendency to hypertrophy or atrophy, temporary or permanent, of the submucous tissue. These changes constitute the condition known as *catarrh*, which may be acute or chronic, and may result in, or be complicated by, infiltrations, abrasions, erosions, ulcerations, and new formations. When the inflammation of the mucous membrane is acute, the exudations may be of a more intense character, and these may be of two kinds, the one from the surface, which was known formerly as *croupous* or fibrinous; the other interstitial and leading to ulceration, which is denominated *diphtheritic*.

A fashion has lately obtained of considering all such exudations as diphtheritic, but I venture to think it is a mistake thus to merge terms very distinctive in signification.

'Gottstein and others apply the word 'secondary diphtheria' to the membranous laryngitis which often complicates the course of the exanthemata, continued fevers, erysipelas, etc.; but it need hardly be pointed out that the value of the word 'diphtheria' is deprived of much valuable diagnostic significance if it be applied indiscriminately to the development of the exudative process when occurring in the case of a laryngeal inflammation of an etiology totally different from that usually ascribed to the primary disease, and characterized by many distinctive phenomena. It would be more reasonable to agree that as, for example, terms of distinction have been applied to various forms of variola, not indicating different diseases, but only different degrees of severity, so also the so-called diphtheria of a laryngitis following small-pox is not a separate manifestation, but only a natural pathological sequence of a septic inflammation of a mucous membrane.

I am not able to agree entirely with [8]Bosworth's conclusions in his endeavour to divide inflammatory affections of the upper air-passages by sharp, well-defined lines, into catarrhal inflammations and those characterized by fibrinous exudations. My own experience especially differs from his, that fibrinous exudation is a usual condition of ordinary superficial tonsillitis, and its manifestation would at once lead me to suspect a septic origin of an attack. I should hold that, except in some rare cases with young children, fibrinous exudations in either fauces or larynx are generally significant of microbic influences. Bosworth's subdivision of these exudations into innocent and baneful is in my judgment only too likely to lend encouragement to an over-sanguine prognosis.

Why some affections of the throat, arising apparently from the same cause, should sometimes attack the nares, sometimes the fauces, and sometimes the larynx, is a problem which as yet is by no means solved.

By far the majority of inflammations of the larynx are of a sub-acute character, and arise as an extension from the nares or fauces in association with nasal stenosis. Why should they not by preference extend into the œsophagus, which tube is much more directly continuous with the pharynx? [9]Cohen says, 'Most probably because the flaccid œsophagus is normally closed except during the act of deglutition, and thus is less exposed to atmospheric influences than the patulous respiratory tract.' This answer is, however, by no means entirely satisfactory, for we see a large number of pharyngeal diseases of more or less pronounced atmospheric origin, and having a direct relation to the digestive apparatus, but which never attack the larynx. A suggested explanation is based on the steadily growing belief in the parasitic nature of disease. The throat affections of the exanthemata and continued fevers, as also diphtheria and almost all forms of insanitary sore throat and probably even of rheumatism, commence, as a rule, in the fauces and pharynx—rarely or never, be it noted, in the nares. It is probable that the bacilli respectively characteristic of these conditions are both swallowed and inhaled. Those swallowed may be checked in their development by digestion; while in the case of those inhaled, absence of these destructive fluids and the free access of oxygen would favour the activity of their life-processes. The probability of the explanation I have here offered, of immunity of extension to the œsophagus of pharyngeal disease, is strengthened by the fact that while tuberculous ulceration of the pharynx spreads, as a rule, downwards to the larynx, but never

upwards from that region, no case has been reported of extension from the fauces to the gullet.

We have spoken of catarrh, and it will be well, before proceeding further, to consider what is meant by the catarrhal tendency'—by 'taking cold'—the condition which not only predisposes some individuals to be more liable than others to respiratory affections of the throat, but which also plays so large a share in the element of recurrence.

Broadly speaking, the words imply a constitutional condition either original or acquired, which renders the individual unable to withstand the injurious influences of a lowered temperature.

[10] Woakes, applying the term 'modifications of nutrition to all the processes of inflammation, whether acute or chronic, as well as to some hypertrophies of tissue which are either congenital or originate shortly after birth,' endeavours to account for them all as possessing a *uniformity of type*. He argues that all these 'modifications of nutrition are traceable to an *anatomical mechanism* normally operating in the healthy economy,' and that this anatomical mechanism is to be 'found in that portion of the nervous system constituted by the *ganglia of the sympathetic* chain and its afferent and efferent branches.' In other words, he appears to consider all forms of disease of the throat, nose, and ear, from the simplest pharyngitis to diphtheria, from a cold in the head to polypus and necrosing ethmoiditis, from Eustachian obstruction to auditory nerve vertigo—as dominated by vaso-motor disturbance. The arguments by which this view is supported are plausible and elaborate, but in truth do not serve us very much in a practical sense; for so far from directing treatment, as one would expect, on more purely medical or hygienic lines than has hitherto been the case, probably no English specialist of recent times has devised bolder surgical operations for the relief of these modifications of nutrition, especially in the naso-pharygeal region, than the author under notice. The theory is withal not one of entire novelty, except in the extent to which it is applied. Carried to its logical conclusion, it might be made to account for almost every disease to which mankind is subject. Primarily, without doubt, the vaso-motor system which controls the circulation is at fault in the majority of throat diseases; but the catarrhal tendency—the disposition to take cold—may in a secondary but not less important sense be dependent on any one or on several of the many and varied constituents of defective assimilation and nutrition, and the practitioner will require to make careful search as

to the individual causes of a baneful nature in the general health of each separate patient as he comes under notice. While, therefore, the causation of the so-called catarrhal condition may be largely influenced by circulatory defects in the constitutional state, sometimes inherited and often acquired, there is nothing to show that such an influence has any more power over passages of the throat or nose, than on a similar condition when manifested in the common bile-duct. Moreover, the importance of the many constitutional, atmospheric, and functional causes for inflammation of the air-passages cannot be thus ignored, minimised or dismissed. The idea is now steadily gaining ground that so-called catarrhal conditions of the mouth and throat are intimately related to the innovation of these regions by micro-organisms.

In connection with the constitutional conditions influencing the catarrhal tendency, we may here conveniently speak of other dyscrasiæ predisposing to throat diseases scarcely less specific than those associated with tubercle or syphilis.

The constitutional state which in my judgment exercises the strongest influence on diseases of the throat, especially of the pharynx, is that known under the various and more or less interchangeable names of rheumatic, gouto-rheumatic or gouty; the darthous, arthritic or lithic acid diathesis. And here also there may be traced a certain relationship between the systemic cause and the local result. The simple rheumatic throat, consisting of pain, especially in performance of ordinary muscular acts, with but little hyperæmia, is only to be treated by local measures of relief, supplementary but subordinate to those required of a more general character; or, to look at the matter from another point of view, arrest of follicular secretion of the tonsils leading to acute inflammation, and perhaps suppuration, will occur, under etiological conditions favourable to a general rheumatism, and will be ushered in by all the constitutional signs of the same malady. Like general rheumatism, no sooner is one side of the throat relieved than, in many instances, the opposite side is similarly attacked; while if the throat affection be arrested by local measures only, a sharp attack of muscular or articular rheumatism may ensue. Again, granular pharyngitis, a lesion of the discrete lymphoid follicles of the pharynx, although often excited by causes of functional character, generally occurs in an individual with certain well-recognised faults of general secretion and assimilation in association with some well-marked diathesis or with nasal obstruction. On these accounts, and for many other

reasons, it is, in my opinion, a mistake to suppose that there is a special individuality of pathology of diseases of the throat to anything like the extent that we find in the case of the eye or ear.

Second only to the darthous diathesis as predisposing factors in throat diseases stand the various exanthemata and other fevers and the strumous diathesis. They will be more conveniently discussed, however, under various headings later.

It remains to be noted that there are many anatomical facts of a surgical character apart from the results of nasal stenosis which exercise influences of a special nature on throat diseases.

Just glancing at clefts and unduly high arches of the palate as troubles purely anatomical, we may see how in the close investment of the mucous lining of the hard palate there is a predisposing cause to disease of periosteum and bone in cases of inflammation and ulceration of this region, and on account of its muscular arrangement, as well as of its physiological duties, how important is health of the soft palate to all the functions of the upper portion of the throat.

The intimate connection of the faucial tonsil with the pharyngeal muscles accounts for the pain in deglutition in all inflammations of those glands. Enlargement of these structures as a cause of deafness is not due to closure of the Eustachian tube, as was formerly taught, by direct pressure of the enlarged mass. Such pressure is anatomically impossible, and the cause is to be found rather in extension of the chronic inflammation and thickening of the gland to the tube, and by disturbance of the muscles of the soft palate connected with its patency. The laxity of attachment of the pharynx, so necessary to its mobility and contraction, accounts for the disposition to effusion and suppuration in its surrounding connective tissues, while its close relationship with important vessels adds very specially to the dangers of all such inflammations and abscesses. To the looseness of its connections may also be ascribed much of the liability to ulcerations, to the formation of pouches and the lodgment of foreign bodies, and also in a measure to varices. The varieties in thickness and tension of the mucous lining and submucous coverings of the larynx account for the varying liability of different portions to congestion and œdema.

[11] Treves asserts that 'the affection known as clergyman's sore throat has an interesting anatomical basis,' which he thus explains: 'The mucous membrane of the larynx is well provided with

mucous glands, whose function it is to keep moist the parts concerned in phonation. When an individual speaks aloud for a long while, the lining of the larynx tends to become dry, on account of the large amount of cold air that is drawn directly through the mouth. To still keep these parts moist the mucous glands have to exhibit increased energy; and in those who speak much in public the glands may in time become so overworked as to inflame. It is the inflammation of these glands that constitutes the present affection. The glands are not distributed equally over all parts of the larynx, but are most numerous in the membrane covering the arytenoid cartilages and parts immediately about them, the base of the epiglottis, and the interior of the ventricle. It is in these parts, therefore, that the changes in chronic glandular laryngitis, or dysphonia clericorum, are most marked.' The statement is quoted at length because there is no doubt that the views represent the prevailing notions as to the pathology of speaker's and teacher's throat, but after what I have previously written, it must be evident that abeyance of nasal respiratory function from obstruction, the associated microbic and chemical contamination of the oral and pharyngo-laryngeal secretions, and the consequent changes in the lymph-secreting mechanisms, are factors of equal, if not greater, importance than lesions of the mucous glands. The idea that simple much-speaking, independently of faults in the method of voice-production, will lead to laryngeal inflammation, must be accepted with some reserve; for, as it is hardly necessary to remind the reader, only a small percentage of clergymen and other active voice-users suffer from the disease.

Of very great importance in all nervo-muscular diseases of the larynx, are the anatomical relations of the recurrent laryngeal nerves, already described. From their tortuous course and their vicinity to vessels, glands, etc., it is easy to understand that aneurisms and enlargement of glandular structures may cause pressure on one or both nerves, and thereby give rise to characteristic and well-defined symptoms in the larynx, to be considered more in detail in the section devoted to laryngeal neuroses. When the nerves supplying the intrinsic muscles of the larynx are injured, vocalization must be, and respiration may be, impaired; and further on it will be seen how numerous are the causes which may affect the action of the vocal cords.

Regarding new formations, any inflammatory thickening or loss of tissue in, or new growth upon, the epiglottis will cause embarrassment in deglutition, but will not always influence the voice; in other situations a similar condition will affect phonation. It is astonishing how much *lateral* displacement of the larynx,

from pressure of external tumours, may take place without embarrassment of either voice, deglutition, or respiration; but if there be the slightest *constriction*, as in those forms of goitre, the lateral lobes of which embrace and compress the larynx and gullet, dyspnœa, and later dysphagia, become prominent and distressing symptoms. This interesting question has been illustrated by various specimens exhibited by me at the Pathological Society (vols. xxv. and xxvii.); and also by a short paper entitled 'On the Causation of Dyspnœa in Suffocative Bronchocele,' which appeared in the *American Journal of the Medical Sciences* for April, 1877, and which was suggested by perusal of a graphic report of a case of Suffocative Bronchocele, by Dr. John B. Roberts of Philadelphia, printed in the same journal for October, 1876.

Foreign bodies are sources of discomfort in all parts of the throat. Naturally, if the situation be in the larynx, respiration will be embarrassed; but even when one is impacted in the œsophagus, it is liable to press in front upon the trachea, and so give rise to respiratory symptoms. When the œsophagus is the seat of malignant ulceration, the points most frequently attacked are (1) opposite the cricoid cartilage, which offers the only point of resistance on the anterior wall of the œsophagus, and (2) at its entrance into the stomach.

Proceeding now to consider the various **functions** of the throat in their etiological relations to disease, we come first to the physiological duties of the throat; and, as a natural consequence, a large proportion of throat affections exert impeding influences on these processes.

Respiration.—One of the main predisposing causes of respiratory troubles in the throat is an unnatural method of breathing through the open mouth, the result of hypertrophic morbid obstructions in the nose, in consequence of which the air is taken directly on to the mucous membrane of the pharynx and larynx, unmodified in temperature, unmoistened, and unfiltered as it would be if breathed through the natural first avenue of respiration—the nostrils. I cannot admit with [12]Gottstein that the nasal cavity 'imperfectly fulfils its normal function in this direction,' for any defect in its action is due either to hypertrophy and stenosis, sometimes to a pernicious habit, or, it may be, to a pathological process brought about by vices of civilization. Long-continued mouth-breathing not only gives rise to pharyngeal and laryngeal mischief, but it also intensifies, if it does not originate, many nasal disorders. It is perhaps not out of place to suggest here that Gottstein's strong advocacy of nasal tampons indicates a want of appreciation of, or at least of respect for, the

physiological duties of the nostrils. Such measures would appear to be far more calculated to cause than to cure nasal disease. Another respiratory cause of throat disease to be frequently referred to in these pages is the method of filling the lungs and of economizing its exit during voice use.

Akin to the function of respiration is the influence of the general circulation on throat diseases, independently of atmospheric or other influences which may affect it. We have local congestions and inflammations occurring in the full-blooded subject, and local muscular enfeeblements in the anæmic. We find also local varices associated with general evidence of a like nature, such as rectal hæmorrhoids, varicoceles, varicose veins of the lower limbs, etc., and with similar general constitutional symptoms, or caused by constitutional states of functional local strains of the same nature as produce the like effects elsewhere. Comparatively slight deficiency of general vaso-motor control will cause congestion of the thyroid gland and of the mucous membrane of the larynx, with a possible accompaniment of varix of the pharynx and the base of the tongue. One or all of these conditions, though often unrecognised, generally exist together with lymphoid hypertrophies, as objective factors in the production of the condition known as *globus hystericus*. The influence of disorders of the menstrual function on the respiratory passages are so well marked, as in ozæna and some so-called hysterical throat symptoms, that we are often led at once to make pertinent inquiry on such points merely from the local evidence, and with the result of much wider applied and more complete therapeutic measures.

Diseases of the throat in relation to the function of **deglutition** are often due to disobedience of physiological laws in performance of the act of **mastication**. Deficient natural teeth, or imperfect action of artificial substitutes, give rise to many functional disorders of swallowing, and may even be the precursor of organic lesions. Local irritation of food unduly hot in temperature, or *piquant* in character, will lead to undue capillary stimulation, and reactionary relaxation and congestion. The frequent taking of ices and iced water is doubtless also a source of many throat disorders, but not, in my experience, to anything like the extent caused by the contrary practice. In either case the mode of action on the laryngeal mucous membrane is similar to that of sudden alternations in the temperature of the inspired air. Alcoholic drinks exert, for the most part, except in their more ardent forms, a local influence on the throat mainly through the general system. But there are so many specially characteristic symptoms and effects

produced from this cause that there can be no doubt as to the directly deleterious action of stimulants on the organs of the voice.

I have reserved for the last of functional abuses as causes of throat disorder that of **defective voice-production**, though of its importance I hold very strong views, probably stronger than those generally taught or accepted. [13]Mandl was the first to point out that fatigue of the voice is a direct result of a wrong process of use, and having for many years been convinced of the truth of his teaching, I have lost no opportunity of enforcing it, both in treatises and pamphlets and delivered lectures. I go even further than Mandl, and believe that the generally accepted doctrine of a special proclivity of singers to throat troubles lies entirely in vices or imperfections of cultivation. [14]Carl Seiler, as the son of a most distinguished author and teacher, has naturally grasped the fact, and his explanation of the causes of granular pharyngitis is so complete in this direction that it should be laid to heart by all teachers of singing, as well as physicians. I am not able entirely to agree with either Seiler, Cohen, or others who think that any portion of the larynx, much less the vocal cords themselves, is often over-strained 'in singing, screaming, public speaking, prolonged reading, talking to the deaf, quarrelling, and so on;' for not only have I rarely found local evidences of such a condition, or local treatment of the larynx of avail in its cure, but, on the other hand, I have seldom failed to find the cause of the vocal lesion in the nose or pharynx, and a cure effected by surgical treatment of those regions, supplemented by educational correction of a functional fault in production. And I am here tempted to make two digressions, one as to the value of knowledge gained by the laryngoscope as an aid to the attainment of greater perfection of the vocal arts and by consequence as a safeguard against functional diseases on the part of its exponents; and secondly on the question of rest *per se* as a curative agent. As to the first, it is very unfortunate that great singers, whose perfection is to a large extent the gift of nature, should, because they have not felt the necessity of physiological teaching, ignore its value to the less highly gifted; and it is especially to be regretted that at least one throat specialist—a highly respected American *confrère*—who has the reputation of being also a fine singer, should give support and weight to the screechings of the uninitiated against the capability of the laryngoscope to help in formulating methods of voice-production; and the rather that his recognition of the more prominent causes of vocal disability is evidently founded on much laryngoscopic experience. Such objectors particularly forget that the laryngoscope was the invention, not of a physician, but of a pro-

fessor of singing—Manuel Garcia—and was the direct outcome of his endeavours to settle certain disputed points on tone-production in the larynx. The investigations of that famous teacher have not only had that effect, but they have led to the formulation of certain laws in teaching which were previously promulgated only as ideas unsupported by facts. My views on the importance of scientific teaching as a foundation of good singing have been enforced with particular detail in a lecture,[15] to which those interested may be referred; and also in *Voice, Song, and Speech*. I must limit further present reference to the subject to enumeration of only a few instances of the value of laryngoscopic teaching. It may be noted that (1) the laryngeal mirror proves the absurdity of supposing that the ventricular bands approach in tone-production—a supposition on which a very pernicious school of teaching is founded; (2) by the same means may be demonstrated the various methods of commencing and of ending a tone; (3) a pupil may be shown, and therefore be better enabled to appreciate, the various positions of the cords and the shape of the space between them in production of the different registers; and (4) the effects of forcing the registers beyond their natural limit may be similarly demonstrated. And akin to these lessons in the larynx, physiological demonstration of the action of the soft palate in tone-production enables the pupil to appreciate the importance of exercises directed to the strengthening of the muscles in this region with increased readiness and thoroughness.

The subject of **rest** as a curative agent may appear out of place in a chapter on causes of throat affections; but as I have shown how important it is to recognise faults in method as etiological factors of disease, I would here incidentally express my equally strong conviction that, while rest may obviate functional difficulty for so long as it is observed, it does not prevent speedy relapse of a trouble due to wrong production so soon as functional activity is resumed, provided the fault of method remains uncorrected. It is in the want of recognition of this fact that an explanation will often be found for the frequency of recurrence of the majority of the vocal disabilities of singers, for it is an undoubted fact that the best singers, and the greatest orators—those who most use the voice—enjoy the greatest immunity from functional disability, and this because, though they exercise the organ largely, they exercise it rightly, and, therefore, without evil consequence.

It remains only to touch on a few etiological factors of throat disease of a hygienic character. Omitting those of age, sex, heredity, etc., which have no special signification in this connection, we may consider those of climate or atmosphere, occupation.

surroundings, and clothing. Some dietary faults leading to throat affections have been alluded to under the functional portion of our remarks.

Concerning **atmosphere** and **climate**, [16]John N. Mackenzie, has in a recent article (brought under my notice since this chapter was first prepared) treated, with much originality and vigour, on the 'geographical limits of catarrhs,' and has laid down certain propositions, with most of which I can but express complete concurrence. He says: 'In those countries where extremes of temperature follow each other in rapid succession, where the thermo- and barometrical fluctuations are most sudden, and occur with the greatest frequency, and where the material composition of the atmosphere is continually changing, catarrhal affections of the naso-laryngeal tract are most frequently met with. The appearance of the disease seems to depend not so much upon the degree of heat or cold as upon the rapidity and intensity of the change from one to the other.' In this way is explained the origin of severe catarrhs in warm weather, on occurrence of cooling showers, or from the influence of cold, damp nights in tropical climates. The influence of season is also explained; for 'while spring and autumn furnish perhaps the largest percentage of nasal and laryngeal catarrhs, the coryza which appears in the summer months, when the air is suddenly cooled or altered by electrical and other disturbances, yields to none in the severity of its symptoms and course.' I entirely concur with the same author's statement that the injurious effect of cold *per se* has been grossly exaggerated; whereas excessive moisture—*i.e.*, damp—exercises a potent influence in production of catarrhal inflammations, and is almost equally intensified for evil by oppressive heat as by extreme cold.

That the inspiration of cold dry air is not harmful (except on sudden change from heat), but, on the contrary, beneficial, we now know by manifold experience of the treatment of phthisis by residence on snow-covered mountain plateaux; but it is different when we consider dry cold air as it may strike the larynx or its neighbourhood externally, either as a draught on an overheated body, or by exposure to keen north or north-east winds. From such a cause acute inflammation, with deficient mucous secretion and with marked spasm, may occur. The only apparent cause, in some cases of abductor paralysis, is of such a nature. It is doubtful if hot winds, unaccompanied by moisture, act as factors in the causation of throat diseases. I have not sufficient clinical evidence to make any assertion on the subject, but I am inclined to think that while keen draughts of cold air acting on an overheated and fatigued individual may predispose to submucous forms of inflam-

mation (œdema), inspiration of damp cold air, wet clothing, etc., are the main etiological factors of mucous inflammations. Analogies for this view may be found in the relative causes of a pneumonia and a bronchitis.

Just touching on the question of soil, and noting, for instance, the difference of liability to throat affections of those who reside on clay as contrasted with the comparative immunity of inhabitants on gravel, we next come to dust as a cause of naso-pharyngeal and laryngeal disease. I am here unable to express agreement with John Mackenzie that 'comparatively few cases of inflammation originate in this way;' for I have seen many instances in which the dust of a ball-room, of the country, or of the street, will be the direct, constant, and apparently the sole cause of an attack. A gentleman at the present time (1887) is under my care who suffers from severe coryza, with symptoms of pseudo hay-fever and asthma, from dust, however inhaled—as, for instance, in the course of a ride on horseback. This patient also finds the dust arising from wood pavement—in which much insanitary material is, as it were, ground-in, to become separated in dry weather—peculiarly provocative of attacks; and this is by no means a solitary case. That the dust is the *exciting* cause is proved by the fact that in many instances immunity against its influence may be ensured by the simple measure of anointing the inside of the nostrils with vaseline. And this leads me to say that I believe it will generally be found that the *predisposing* cause in all cases of inflammation excited by dust—and, indeed, of many other varieties—is an unduly hyperæmic and hyperæsthetic condition of the coverings of the middle and inferior turbinated bones. This subject will receive further discussion later.

Allied to this question of dust are the injurious results, frequently witnessed, of the breathing of insanitary germ-laden atmospheres, due either to unhealthy surroundings or imperfect ventilation, and again the overcharging of the atmosphere with volatile matter of a poisonous nature—as in certain chemical and other manufactures, and especially in rooms filled with tobacco smoke. [17]I have elsewhere treated at such length of the use of tobacco as a frequent cause of throat disorder in singers, and in a less degree in all brought under its sway, that I will content myself here with saying that there is little reason to doubt that the inhalation of an atmosphere charged with tobacco smoke is far more baneful in its local effects than the moderate habit of smoking in the open air or in well-ventilated apartments. The explanation of this fact is so obvious as not to require more detailed consideration.

Finally, allusion should not be omitted to the gradually accumulating and convincing evidence of the promulgation of disease, especially of tubercle, by the contagion of germs inspired through the air-passages.

In the matter of clothing, insufficiency of covering and retention of damp garments are more liable to induce throat diseases than too much clothing, unless, in the latter case, the patient is careless to regulate the amount according to changes of temperature to which he may be subjected. Russians and Canadians, who wear the warmest furs out of doors, but instantly remove them on entering a dwelling-house, are less liable to throat diseases than the English, who sit through a two hours' service in church in overcoat and other extra outdoor coverings; or who, on the other hand, will stand at an open grave on damp clay permeated with exhalations from decaying matter, and with head uncovered, quite irrespective of the wind or weather. As a converse of the proverb regarding one marriage leading to others, attention to the much more serious truth that many deaths arise directly from disease engendered by funeral attendance at the grave-side should be more generally urged on the public; and this fact should be one strong argument added to the many others in favour of cremation.

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CHAPTER IX.

DISEASES OF THE PHARYNX.

NOTE.—References to the coloured illustrations at the end of the volume are made thus: (Fig. 12, PLATE II.); to engravings in the text, thus: (Fig. CII.).

DISEASE of the pharynx and fauces affects primarily the function of deglutition. If the isthmus of the fauces be narrowed, or if the antero-posterior space of the lower pharynx be diminished by abscess or new growth, pharyngeal respiration will be interfered with, and if the naso-pharynx be involved, nasal respiration will also be impeded, and the senses of hearing, taste, and smell will be more or less impaired. Resonance and timbre of voice are altered by pharyngeal disease, as also is speech (articulation), but the pitch is not necessarily affected.

The most common morbid affections of the throat which come under the category of pharyngeal disease are those which are inflammatory in their origin, and these usually attack the pharynx as a whole; but it often happens, as [1]Cohen has pointed out, that there exist 'certain territorial regions, which, in consequence of participation in the same vascular, lymphatic or nervous distribution, are apt to become sore or inflamed together. Thus the anterior surface of the palate and uvula, the anterior folds of the palate, the tonsils, and sometimes the base of the tongue, form one region; the posterior palatine folds, posterior surface of the palate, upper portion and vault of the pharynx, and posterior portion of the nasal fossæ form another; the lower pharynx, epiglottis, lingual sinuses, and upper portion of the larynx form a third.' It is principally to diseases in the first, and with a portion of the second, of these somewhat arbitrarily subdivided territories that our attention will be at present directed; that is to say, with

THE ORO-PHARYNX AND FAUCES.

These, as explained in the section on Anatomy, comprise that part of the throat which may be seen at the back of the mouth by direct or reflected light, without the intervention of mirrors for

exploration of the upper—*naso-pharyngeal*—or lower—*laryngo-pharyngeal*—region; or, to speak still more definitely, our first group will include—

Diseases of the Anterior and Posterior Palatine Folds
„ „ Posterior Wall of the Oro-Pharynx.
„ „ Base of the Tongue.
„ „ Soft Palate and Uvula.
„ „ Tonsils.

The oro-pharynx and fauces are liable to inflammations which may be acute or chronic, forming the affection popularly known as 'Sore Throat.' Such inflammation may be general, and involve all the tissues; or, more commonly, as already mentioned, only portions of the various parts which combine to form the upper throat.

Inflammations of the pharynx, when primary, are usually called 'catarrhal;' though diathetic influences, to be scarcely considered secondary, as those of rheumatism and scrofula, as well as functional abuses, frequently play an important part in the origin and course of the disease broadly—that is to say loosely—denominated catarrhal pharyngitis.

I agree with [2]Schech in not recognising a purely **gouty** sore throat, although I have seen cases in which administration of gouty specifics were necessary adjuncts to the local measures taken for relief. Nor do I consider it necessary to speak of a **rheumatic** angina as a separate malady, thoroughly convinced though I am of the very frequent influence of such a diathesis. I have, for example, often seen cases of pharyngitis, subacute in intensity, and characterized by undue hyperæmia, and great irritability of the mucous membrane; and they have also been associated with eczema, especially of the auricle, of the gouto-rheumatic nature of which there is, of course, but little difference of opinion. To further simplify the subject, I do not devote any space to **herpes** of the pharynx, because it is an extremely rare disease in this country. In the very few cases I have seen, the herpetic eruption has been manifested on the anterior portion of the soft palate. Occasionally, also, I have witnessed an **aphthous** exudation in the pharynx of the adult, unaccompanied by stomatitis. The patients have, for the most part, been females. [3]Schech mentions also a pharyngitis following scurvy, and gives to it the name of angina **scorbutica**. Neither of these appear to me to require separate consideration.

More legitimate secondary forms of pharyngeal inflammation

are those arising in the course of the continued fevers and exanthemata, those due to the toxic influence of impure water and defects of drainage, and the special manifestations which are exhibited in this region in connection with syphilis, cancer, and tuberculosis.

ACUTE PHARYNGITIS, CYNANCHE PHARYNGEA, ANGINA SIMPLEX VEL CATARRHALIS (Fig. 12, PLATE II.).

The grades of pharyngitis may vary from a simple hyperæmia or erythema with slight submucous infiltration, to an acute phlegmonous inflammation with œdema, fibrinous exudation, or suppuration, such modifications depending largely on the nature of the etiological factor. The milder forms are generally due to cold or chill, and for the most part exhibit but local symptoms of no particular gravity; the second have a diathetic or septic origin, and exerting a wider and more serious influence on the general economy, call more urgently for constitutional as well as local treatment. All varieties are associated with more or less nasal obstruction.

ETIOLOGY.—Age exerts, in my experience, but a very indefinite influence on catarrhal pharyngitis, though common sore throat is said to be most frequent in children and youths. When such is the case, a scrofulous diathesis is generally at the root of the trouble; while in the adult the constitutional tendency is most frequently rheumatic, this being evidenced in varying degrees in different individuals. In all, poor food, insufficient clothing, bad ventilation, and any circumstance likely to vitiate the general circulation are amongst prominent predisponents. In the adult, occupations of a sedentary character, as well as those involving respiration in poisonous atmospheres; alcoholic intemperance, the use of tobacco, over-indulgence in highly-seasoned dishes, and the taking of hot fluids, are factors to be sought for, and when present, corrected, since they all act as local, and many of them as general predisponents.

Amongst the most usual exciting causes is that of a 'cold.' Occupation of a sedentary character, in which the subject takes insufficient exercise for the well-being of his general circulation, has been mentioned as a predisponent; but it is probable that in such a case the subject has carried on his employment in an insufficiently ventilated room, for I find pharyngitis equally common amongst tailors who sit, and in printers who for the most part stand, to their work, the atmospheric conditions being equally pernicious in both cases. In these and many other trades the exciting cause is generally a 'chill,' mainly brought about by

exposure to draughts of cold air striking on an overheated body. The disease is thus common in people engaged near hot furnaces, or in those who, working in ill-ventilated and over-crowded rooms, are exposed to draughts, or who go out of such rooms into a suddenly changed atmosphere. Damp-cold air is particularly likely to cause inflammation of the throat; hence the larger proportion of such cases occur in the spring and autumn, or on the occurrence of a thaw after hard frosty weather. Use of the voice under unfavourable conditions may lead to pharyngitis, whether followed or not by inflammation of the larynx. Amongst traumatic causes of pharyngitis may be named irritant poisons, boiling water, and scorching heat of steam or flame, and the lodgment of foreign bodies, as the small bones of fish, game, etc.

Children are very liable to simple catarrhal sore throat, the local tendency passing off as they grow up, though too frequently the predisposition is perpetuated in a liability to more serious catarrhal disorders, which perniciously influence the whole period of life.

As previously pointed out (Chap. VIII.), a large number of cases of pharyngitis are met with in the victims of nasal and naso-pharyngeal obstruction, and this is especially noticeable in the case of the young.

Symptoms: A. Functional.—The **voice** is thick and husky in enunciation, but there is rarely actual vocal hoarseness or aphonia unless the disease extend to the larynx. The voice is quickly fatigued, and exercise thereof is not infrequently painful.

Respiration.—Unless associated with laryngitis there is no dyspnœa, but nasal respiration is often obstructed.

Cough.—True cough is seldom present, but there is usually a constant tendency to hawk or *hem*, accompanied by slight expectoration of viscid, transparent, more or less greyish pellets of mucus, which are occasionally streaked with blood.

Deglutition.—The act of swallowing is always painful, or at least accomplished with discomfort in the acute form.

Hearing is usually impaired in those cases where there is enlargement of faucial, pharyngeal or tubal tonsils, or even in inflammation of the posterior pillars of the fauces.

The **Senses** of **Taste** and of **Smell** may be both temporarily impaired.

Pain, independently of exercise of functional action, is a strongly-marked symptom of pharyngeal inflammation. There is very generally first described, a feeling of stiffness, with itching; then stinging or shooting, followed by a sensation as of great tightness and constriction, and of the constant presence of a foreign body in the throat, causing the patient to repeatedly perform the act of swallowing. Pain in the tympanum is either the

result of Eustachian catarrh and obstruction, or it is conveyed from the throat along the main trunk of the glosso-pharyngeal to Jacobson's nerve. When pharyngitis extends to the laryngo-pharynx, every movement of the larynx, or even of the neck, may be attended with distress.

B. PHYSICAL.—**Colour** is increased according to the severity of the attack, from a simple bright pink to a livid scarlet, and with exaggeration of the calibre and distinctness of the superficial capillaries. The coloration varies also greatly in different portions of the inflamed region. The posterior wall of the pharynx is, as a rule, the most heightened in colour, though sometimes only the soft palate will be hyperæmic; while in other cases the surface of the tonsils may be the sole portion of abnormal hue. The uvula and fauces may be translucent from œdema, and the hyperæmia in this region is always greater than in the lower portion of the pharynx.

Form, etc., is modified according to the amount of submucous or serous infiltration. The surface texture is at first shiny and smooth; later it becomes thickened and velvety, or roughened and granulated, owing to prominence of hypertrophied lymphoid glandules. Loss of tissue is rare, unless the attack be due to toxic or traumatic causes.

Secretion is at first arrested, causing the throat to feel dry and rough, or as if a hair were in the throat; later, it becomes viscid and tenacious; and, lastly, muco-purulent or purulent. I am in agreement with [4]Beverley Robinson in not recognising fibrinous exudations as usual or even occasional concomitants of a pharyngitis or tonsillitis, unless the inflammation be septic or traumatic in origin, on this point differing from [5]Bosworth. I am even inclined to suspect the simple catarrhal origin of the attack when œdema extends beyond moderate infiltration of the extremity of the uvula.

Both Cohen and Bosworth describe a 'Common Membranous Sore Throat,' each author agreeing to give an almost verbally exact portraiture; but it is not familiar to me, and must be rare in this country. It is said to be an acute inflammation of the mucous lining of the pharynx, characterized by the eventual exudation of a fibrinous material which coagulates on the surface of the membrane into a pellicle or pseudo-membrane, and is oftentimes mistaken for diphtheria. The accompanying drawing (Fig. CII.) represents the nearest approach to such a condition that I have myself encountered.

It was taken from the throat of a gentleman aged forty, who had suffered from acute rheumatism at seventeen, and had recently returned from Australia after a residence there of over twenty years. During that time he had occasionally suffered from pleurodynia and flying muscular pains, but from no serious rheumatic attack nor from sore throat. The illness for which he applied to me occurred on the first approach of damp and cold

weather in the autumn after his return home. He complained of excruciating pain in swallowing and talking, and on examination the whole of the soft palate was seen to be intensely inflamed, swollen, and relaxed, with enlargement and blocking of the glandules, and very small, easily dislodged pellicles of fibrinous exudation, with some inflammatory areola. There was no evidence of a septic origin, but complaint was made of a general aching of the body 'like rheumatism.' The tonsils were not affected. I prescribed aperients, salicylate of soda, local application of cocaine, and the sucking of ice in small pieces. The attack subsided in a very few days.

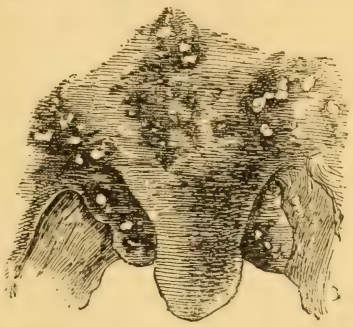

FIG. CII.—ACUTE PHARYNGITIS, WITH SLIGHT EXUDATION (HERPATIC.)

In many respects this case resembles the accepted description of herpes of the pharynx, but there was no manifestation on the lips or elsewhere, nor had the patient ever suffered from herpes. The exudation was moreover bilateral.

C. MISCELLANEOUS. **External and General.**—The usual constitutional, premonitory, and concurrent symptoms of inflammatory catarrh are always present, though they are greatly modified according to the severity of the local disease. The temperature at the onset is often increased out of proportion to the gravity of the attack—this especially in the case of young children; the digestive system is almost invariably at fault, the bowels being constipated, the urine highly-coloured and loaded with lithates, the tongue furred, and the breath foul. There is frequently co-existing pain in the muscles of the neck, the loins, and the joints of the body generally, and headache is an almost constant symptom.

Commemorative.—The disposition to pharyngeal catarrh is often inherited; and, as already stated, is not unfrequently associated with the scrofulous, arthritic or darthous diathesis.

PROGNOSIS is favourable, unless suppuration of deeper tissues (pharyngeal abscess) supervenes, or unless the inflammation extends to the larynx. When sore throat passes into a 'head cold,' the prognosis is always favourable. Convalescence is frequently delayed by the disease becoming chronic.

TREATMENT: **Constitutional.**—Free purgation, especially by salines preceded by some form of mercury, is in my opinion an indispensable first step; aconite in one-drop doses (Form. 86), until circulation is lowered and perspiration induced, or the salicylates with chlorate of potash or sodium (Form. 98), each acting well where the inflammation is associated with rheumatism. All

other constitutional states predisposing to or accompanying the local inflammation require to be dealt with on the lines of general therapeutics. Fränkel advises quinine in the early stages, believing that it often cuts short an attack. During convalescence, alkalies, with vegetable tonics (Form. 97), are generally indicated. To these arsenic and nux vomica may often be usefully added.

Local.—Guaiacum lozenges (Form. 21) relieve capillary engorgement; and, probably, also act constitutionally where the diathesis is arthritic. Ice taken in small pieces is always grateful; but in some cases mouth-washes or gargles of warm water more or less medicated are preferred. In pharyngeal disease, steam inhalations are almost always fatiguing, and seldom afford proportionate relief. Caustic applications, though still much in vogue, have not afforded, in my experience, sufficient mitigation of suffering to compensate for the discomfort they occasion; and the same may be said of astringents, except in the earliest stages. Glycerine of tannin, so commonly applied, acts usually as an irritant, on account of the attraction of the glycerine for the fluid elements at the mucous membrane, and because, as has recently been proved, tannin does not contract, but dilates the bloodvessels. The sucking of ice or the use of a hand-ball spray of cold water are measures perfectly innocuous, and in many cases act both gratefully and beneficially. Where there is much pain with hyperæmia, cocaine in a five per cent. solution may be used with at least temporary relief and should be applied by means of the spray; but superior to all remedies, as an analgesic, antiseptic, and resolvent, is menthol, employed either as a paint or spray; it may be necessary to apply it to both throat and nose. Mouth-washes of carbonate of soda where the rheumatic influence is strongly marked, or of salicylate of soda, or both combined, are also of service. *Externally*, wet compresses are of great utility. Strong counter-irritants are decidedly harmful, nor, in my practice, are leeches ever employed.

Operative.—If œdema be excessive, scarification may be called for, or ablation of the uvula may be necessary, on account of the actual discomfort it occasions, or of the irritation of the larynx that it induces. Removal of the relaxed tissue and cauterization or curetting of lymphoid granules is, however, better deferred until subsidence of the acute stage, from the possible tendency to sloughing, and because during an inflammatory attack it is not easy to judge how much should be removed. The nature of nasal stenosis must be carefully ascertained and submitted to appropriate treatment. See Chapters XXV. and XXVI.

Diet.—Unless the patient shows signs of exhaustion, food should

not be given at more frequent intervals than usual, although refreshing beverages and simple succulent fruits may be allowed in moderation. In order to give rest to the function of deglutition, all food should be bland, semi-solid, and warm. Stimulants are by no means necessary, the favourite port-wine treatment of tradition being a fallacy.

Hygiene.—Predisposing causes, being carefully ascertained, must be naturally guarded against, and in children the most likely predisponent causes should be promptly and thoroughly obviated. Spring and autumn being most favourable to this form of angina, patients should particularly guard against the too sudden changing of their clothing and variations of their habits of life indicated by the alternation of season. Of all things the subjects of catarrhal soar throat should avoid constipation. When attacks are frequently recurrent, a course of treatment at Aix-les-Bains has a powerful effect in diminishing the patient's liability. Cold baths, and especially external local douching with cold salt and water, appear to act as prophylactics against 'catching sore throat;' but in subjects who suffer from defective circulation, such Spartan treatment is by no means to be recommended, and warm baths, with cold douching, or the standing in hot water during the drying of the body after a cold bath, will often be preferably employed. In this connection it may be usefully hinted that in many cases the sea or river bath, as taken in this country, is not only contra-indicated, but is positively injurious.

SUPPURATING PHARYNGITIS; HOSPITAL SORE THROAT.

These terms have been variously applied to that form of acute pharyngitis which occurs in persons whose system has become much reduced by hard work under exceedingly unfavourable sanitary conditions of the inspired atmosphere, as well as, in some instances, of food and water supply. Thus, amongst its causes may be mentioned work in the dissecting-room, absorption of septic material from unhealthy wounds, the nursing of patients suffering from erysipelas and various fevers, exposure to bad drainage, drinking unhealthy water, etc.

Probably the pharyngitis sometimes occurring in patients suffering from small-pox, typhus, and typhoid fevers, is really of this nature. The angina of scarlet fever, however, is to be considered as a distinct symptom, occurring at an early period in the course of the disease. Nor have I found this septic form of pharyngeal inflammation to be often associated with either syphilis or tuberculosis.

A variety of pharyngitis which may be considered as belonging

to the category of phlegmonous inflammations, but not often seen in our country, is that described by [6]Stöerk as *Chronic blennorrhœa*, and is endemic in Poland, Galicia, and Wallachia. It first makes its appearance in the nose and naso-pharynx in a form similar to the ozæna of hereditary syphilis, and slowly extends downwards through the pharynx, larynx, and in exceptional cases even to the trachea and its bifurcations. The inflammation is of the phlegmonous type; the secretions are muco-purulent in character, and are probably the vehicle for the spread of the disease, which in its whole aspect bears a close resemblance to an early throat affection of syphilis, with this important difference, however—that the ulcerations are sluggish, unaccompanied by rapid loss of tissue, and are entirely unaffected by specific treatment.

The particular diagnostic sign of phlegmonous pharyngitis is that it is by no means confined to the areolar tissue, but generally extends to the deeper structures, leading to suppuration, which may involve the submucous tissues, and may burrow either beneath the deep cervical fascia, or may point and open into the œsophagus. Or, as is not unfrequently the case, the œdematous inflammation extends to the larynx, to the imminent danger of suffocation. It is very apt to take on a sloughing character, and as a result, severe and even fatal hæmorrhages may occur.

The tonsils in phlegmonous pharyngitis are always, from the first, highly inflamed and greatly swollen, so much so that the disease may at first be mistaken for a tonsillitis. Differing from what occurs to the other tissues of the pharynx, the tonsillar inflammation is principally of the mucous membrane and peritonsillar connective-tissue, and does not, as a rule, extend to the parenchyma or gland structure itself. The tonsillar swelling is usually bilateral—a diagnostic point of distinction from ordinary quinsy—and may be so extreme as to seriously threaten life by direct obstruction of respiration, both naso-pharyngeal and oral. The act of swallowing is equally distressful, and may become impossible. Ulceration may take place from the attrition and consequent irritation of the highly-inflamed surfaces, leading to gangrene of varying area and depth. All the other symptoms of acute tonsillitis, to be later described, are present in an exaggerated degree. The glands of the neck are often most painfully swollen, rendering every movement of the head most agonizing. As already hinted, this condition of the pharynx is apt to quickly extend to the larynx, and to give rise to acute œdematous inflammation of that region.

The attack is usually ushered in by a feeling of illness, with languor, headache, etc. Then follows quickly a rigor with high temperature, rapid pulse, and fever; with delirium at a very early period. The throat, at first dry, soon becomes clogged with thick foul mucus, and acute pain in deglutition is one of the first local symptoms. The general course of the disease, when its origin is unassociated with some specific poison, is very much that of erysipelas. Some authors have described an erysipelas of the throat in which just such a condition of that organ as now described is found associated with erysipelas of the head, face, or neck. It is unnecessary to point out that the etiology, pathology, course and treatment of such a sore throat does not differ materially from that under present consideration.

PROGNOSIS.—It must never be forgotten that the forecast of phlegmonous pharyngitis is always most unfavourable, there being a very great tendency to sloughing, to extension of the disease into the larynx, and to general septicæmia. There are also the dangers of suffocation already alluded to, as well as of the bursting of abscesses into the œsophagus, the passage of pus into the trachea during sleep, or of hæmorrhage from extension of ulceration into some of the larger vessels of the neck. The duration of the attack is from three days to a fortnight. Convalescence is always tedious, and accompanied by many complications when suppuration has been extensive. Temporary paralysis of the muscles of palate, fauces, and pharynx is a not unusual sequel. The prognosis of an external erysipelas that extends to the mucous membrane of the throat is always most grave.

TREATMENT.—The constitutional symptoms being of much greater import than in simple pharyngitis, general treatment must receive special and prompt attention, local measures being, however, by no means neglected.

Great importance is to be attached to tonics, especially iron, chlorate of potash, and bark, and stimulants in large quantities are often indicated. Of local remedies, one of the first in importance is the application of cold externally by the Leiter coil, cloths wet with ice, cold water, and the like, and the sucking of ice or taking of iced drinks. The surgeon is often tempted to make incisions and scarifications to relieve pressure, but such wounds almost invariably slough, and should not be made unless there is distinct evidence of pus pointing at the point to be incised. It is right to add, however, that Stöerk, Fränkel, and Schech advise free incisions even where there be no pus liberated, believing that this measure gives relief to tension, and by the blood-letting diminishes the inflammation. Scarification of the

larynx is an operation often recommended in books, but is not easy of performance when the fauces are swollen.

Tracheotomy is not unfrequently called for, on account of dyspnœa from extension of œdema into the larynx, but, unfortunately, in too many instances the patient fails to rally after its performance. In cases of erysipelas the disease will be almost certain to extend to the tracheal incision.

Where obstruction to respiration is due to enlargement of the tonsils, it is better to excise those glands before proceeding to the major operation of opening the windpipe.

As a precaution against recurrence, hypertrophic rhinitis and septal spurs must be searched for and treated.

Independently of the erysipelatous variety of hospital sore throat just described one occasionally sees a milder form of **ulcerative septic pharyngitis and tonsillitis** in the persons of those closely engaged in post-mortem and dissecting rooms, and also—but not so frequently in these days of Listerism—in surgical wards. The symptoms are those of faucitis, without marked œdema, but resulting in actual ulcerations of a limited lenticular shape, shallow, and covered with a grey pellicle, equally distinctive from the yellow caseous excretions of lacunar tonsillitis, the opalescent mucous patch of secondary syphilis, the excavating ulcer of tertiary disease, or the tough membranous deposit of diphtheria. Constitutional disturbance may be out of all proportion to the often slight local lesion.

TREATMENT consists primarily in removal of the patient from the area of contamination, with change to the country or seaside. Such cases will then speedily recover under local antiseptics and general tonic treatment. Cauterizations so usually adopted are of doubtful utility. Persistence in duty not only render all treatment futile, but may lead to the development of the graver form of malady.

POST- OR RETRO-PHARYNGEAL ABSCESS.

General diffuse suppuration of the pharynx is fortunately a very unusual termination of acute inflammatory attacks in this region. When it does occur, it is usually in that form of sore throat arising from the poison of a fever or of a tainted atmosphere, which has been already described under the heading of 'Phlegmonous Pharyngitis.'

ETIOLOGY AND PATHOLOGY.—Circumscribed abscess of the pharynx is a most rare circumstance, and few surgeons or specialists can recount more than from three to five cases in their own individual experience. [7]Bokai, to whom we are much in-

debted for the correction of many errors concerning the disease, only reported 204 cases as occurring in the Children's Hospital, at Pesth, during a period of twenty-six years. Since the publication of Bokai's monograph, it has been generally assumed that the disease is mainly one of childhood; but for myself, I may say that with an experience of twenty years of out-patient work in institutions treating on an average 5,000 cases a year of disease in the region involved, I have seen but two cases which occurred in children, as against four in adults. By parity of reasoning, the cause I suggest of fallacious deductions in Bokai's statistics, namely, the specialized narrowness of his sphere of observations, might be adduced against my somewhat opposed experience; but this could be true only in degree, for children, even infants, if suffering from throat symptoms, are brought to Throat Hospitals in large numbers.

Formerly, retro-pharyngeal abscess was supposed to be almost always associated with caries of one or more cervical vertebræ, or of the cartilages of the larynx; but it is now conceded that but few are due to this cause, and it is generally recognised as due to a phlegmonous inflammation of the loose connective-tissue between the pharynx and the vertebral column, or of that between the pharynx and larynx; and in a still larger number of cases as a suppurative lymphadenitis, the origin of which is in the deep lymphatic glands which are situated on each side of the second and third vertebræ, and which are particularly large in the earlier years of life. There are thus two distinct classes of retro-pharyngeal abscess to be recognised, those connected with the soft parts and those occurring as a result of caries of the spinal column. I agree with [8]Lefferts, that nasal disease is but a rare cause of the affection under notice, and the same may be said of aural affections, sometimes quoted as etiological factors of post-pharyngeal suppuration. But very few cases occur as sequelæ of other diseases, those reported being generally observed as a complication of scarlet fever, of diphtheria, and of acute suppuration of the middle ear. Other causes are traumatism of a foreign body, and metastasis, of which [9]Nelaton has reported examples in connection with perinæal suppuration. A case is at present (November, 1886) under the care of my colleague, Dr. Dundas Grant, in which the first cause was lodgment of a fish-bone. This was followed by abscess and post-pharyngeal sinus, necrosis of vertebra, and later by pyæmia. The dyscrasiæ predisposing to the disease are scrofula and syphilis. I have seen two cases in adults, in whom it was not possible to obtain a venereal

history, and in these the malady appeared to be due to exposure to wet and cold, with indifferent general surroundings of food and dwelling-place.

Symptoms: A. Functional.—The local signs are not often manifested until the disease has made considerable advance. The chief sign is that of **dysphagia**, the swelling causing a mechanical obstruction to the passage of food; this is not, however, an invariable sign. Coupled with it there is possibly **dyspnœa**, especially if the abscess presses against the larynx, or induces œdema of the glottis. The respiration is almost always stertorous, and when the larynx is complicated it is stridulous. **Cough** of the nature recognised as due to the effort to clear the throat of a foreign body is a common evidence, and especially when the post-pharyngeal obstruction presses against the larynx, or when there is secondary œdematous laryngitis; the **voice** is thick and void of nasal resonance. All functional efforts are followed by extreme general exhaustion. A very characteristic symptom, when there is vertebral disease, is the pain occasioned by movement of the head on the spinal column, causing the patient to keep the head quite stiff when the abscess is in the middle line, or to incline it away from the affected side when the suppuration is situated in one or other lateral space. In children convulsions and spasms are not unfrequently witnessed.

B. Physical.—With the reflected light of the frontal mirror a large swelling may often be observed, the diagnosis, especially in the case of adults, being assisted by use of the laryngeal mirror; palpation with the index-finger will show the tumour to be of 'doughy,' semi-elastic consistence; by the same means the presence of pus may be frequently determined. Examination by this method should never be neglected. It presents no difficulty, if the finger-guard be employed, and does not appear to require pre-administration of chloroform, as has been advised by some authors.

Prognosis is very grave where there is spinal caries, but cases have not been wanting of a favourable termination. In children there is also the additional risk of suffocation from bursting of the abscess during sleep. The most favourable prospect is afforded in those cases in which early diagnosis being made, prompt precautions are taken against any such danger.

Treatment.—Some surgeons recommend great caution in the evacuation of pus in these cases; but I have seen no untoward result from a free opening with the laryngeal lancet. The only precautions necessary are, first, to keep the incision as

nearly as possible in the mesial line, so as to avoid wounding the internal carotid, and then to incline the patient's head forward so as to prevent passage of pus into the larynx. Artificial feeding by an œsophageal tube may be required for a lengthened period, especially in those cases in which there is fistulous communication with the larynx. Iodide of iron, with cod-liver oil, etc., is almost always serviceable as an aid to convalescence, and other suitable constitutional remedies are to be administered wherever the dyscrasiæ give the practitioner indications of their requirement.

SUBACUTE PHARYNGITIS (Fig. 13, PLATE II.).

All the functional symptoms of the acute disease, modified in intensity, are present in this form. It is often seen in association with the milder exanthemata, as chicken-pox, measles, and rötheln (Fig. 16, PLATE II.). When associated with eczema, herpes, or aphtha, to which allusion was made in the prefatory remarks of this chapter, the type is generally of the subacute grade.

SYMPTOMS: A. SUBJECTIVE.—**Voice** is easily fatigued and somewhat hoarse, due to laryngeal irritation, and it may be to rheumatic inflammation of the muscles.

Cough is tickling and irritable, but seldom or never painful.

Deglutition is, without being exactly painful, performed with undue consciousness, and there is a frequent desire to swallow the saliva, or to exercise the muscles of the fauces and pharynx.

Pain is neither constant nor acute, and varies greatly with the temperament of the individual.

B. PHYSICAL.—**Colour** is increased, but by no means uniformly, over the whole surface: for instance, the pillars of fauces and uvula may be hyperæmic, while the rest of the surface is normal; or one side of the throat only may be red, while the other is unaffected.

There may be some **swelling** and **thickening**, and there is generally some disorder of **secretion**, it being increased in quantity, and changed in quality from a clear viscidity to a thick yellowish, or even greenish fluid. When associated with the exanthemata above mentioned, the cutaneous manifestations will be reproduced with slight modifications on the mucous membrane. Constitutional symptoms are but of slight importance.

TREATMENT being commenced, as is always necessary, with purgatives, may be almost confined to local measures. Guaiacum lozenges (Form. 21) are most suitable if there is any soreness, or if the pillars of the fauces are inflamed: astringent lozenges

(Form. 12, 16, 17, and 23) and gargles (Form. 5) are indicated if the pendulous soft palate be the region affected.

With reference to prophylaxis, no person liable to these attacks, seeing the part digestion plays in them, should take sparkling wines, beer, or any fluid containing partially fermented substances. I am also in the habit of forbidding pastry, preserves, and root vegetables, as turnips, carrots, parsnips, and radishes.

The hygienic directions recommended to persons subject to the acute form of sore throat are also to be observed by those subject to the milder attacks.

CHRONIC PHARYNGITIS—CLERGYMAN'S OR VOICE-USER'S SORE THROAT (Figs. 14, 15, 18, and 19, PLATE II., and Fig. 112, PLATE XIII.).

This form of pharyngitis must not be confounded with chronic 'follicular' tonsillitis, as is sometimes the case, but from which it is quite distinct. It may occur simply as a sequel of the acute or subacute form, or it may be caused by one or other of the influences about to be mentioned. It may be present simply as a more or less general congestion (PLATE II., Fig. 14), with thickening of the pillars of the fauces, and having no distinctive features, except its chronicity, from the subacute form (Fig. 13), or the throat may present the appearances which have led to the use of the various terms—granular, glandular, follicular, or herpetic pharyngitis (Figs. 18 and 19). Looking on the pathology of the disease as one of venous congestion, leading to perversion of secretion with more or less enlargement of the follicles of the pharyngeal mucous membrane, I do not recognise these distinctions, and propose to consider all these disorders under one heading. Equally misleading are such subdivisions as hypertrophic and exudative. [10] Morell-Mackenzie, in detailing the objective symptoms of 'Clergyman's Sore Throat,' gives a description of an 'exudative form of follicular pharyngitis,' which is, in point of fact, a very fair picture of so-called follicular tonsillitis, with which he in so many words confuses it. But it need hardly be pointed out that in etiology, pathology, and other indications for treatment, the two diseases are quite distinct; and their consideration as one is surprising in an author who seldom errs on the side of generalization.

ETIOLOGY.—Chronic pharyngitis may, in a measure, be due to disorders of either the glandular, the nervous, or the digestive system; thus its causation may be connected indiscriminately with phthisis, with venereal excesses, or with chronic alcoholism; over-use of tobacco is also assigned as a cause, and in such cases

it will often be found that the subject has been in the habit of frequently expectorating during smoking, and has thus perverted the normal secretion. In other cases, the pharyngitis may be due to the effect of nicotine on the vaso-motor system; or, again, it may be induced by direct irritation of particles of tobacco, as in snuff-takers. With respect to the connection between pharyngitis and certain diatheses and diseases in other parts of the body, neither acne nor herpes, according to my experience, plays an important part as a cause, as has been stated by [11] Isambert and other French authors. I have found many patients the subject of chronic pharyngitis who were not subject to any form of acne or herpes; but seeing that such affections, as well as granular pharyngitis, are due, in some measure, to disorder of the portal circulation or to vaso-motor weakness, it is not surprising that they should sometimes co-exist. Whereas, however, these skin affections require little or no local treatment, it is certain that no form of exclusively constitutional remedy will remove granulations from a chronically congested pharynx.

Among the most prolific causes of chronic pharyngitis must be reckoned improper use of the voice. By this expression must be understood not simply improper voice-production, improper use or over-exertion of voice, which may mean forcing—an act entirely controlled by the pharynx—but also use of the voice, whether rightly or wrongly produced, at improper periods; for instance, public speaking, during catarrhal attacks, as in clergymen and actors, with whom the exercise of the function is a professional necessity; in inclement weather, or under unfavourable circumstances of surrounding noise, causing the individual to speak in too loud a voice, as with military men on the field of battle, open-air preachers and politicians, auctioneers in the dust of sale-rooms, and hawkers and costermongers exposed to the influence of noisy streets and vehicles. Certain it is that this affection occurs more frequently in professionally voice-using subjects who have not, as a rule, had proper voice-training. The particular faults in voice-production, giving rise to chronic pharyngitis, have been dwelt on by us at great length in *Voice, Song, and Speech*. They have been well described by [12] Carl Seiler as due to repeated transgression of the natural limits of the normal registers of the voice, and the *modus operandi* of the pathological process has been accurately explained by him.

Finally, it seems to be almost universally admitted that chronic pharyngitis very frequently owes its origin to oft-recurring acute attacks.

PATHOLOGY.—Chronic pharyngitis differs from the acute form,

not only as regards its duration and course, but also in as much as the hyperæmia is less intense and less diffuse, and is not accompanied by so much general swelling. On the other hand, enlargement of the glandules in isolated groups, or in large patches, is oftener observed during chronic than during acute inflammation in this region; and engorgement of the superficial veins of the pharynx—a condition never present in acute catarrh—is quite common in the chronic form. The morbid process by which a throat arrives at a chronically inflamed condition has been touched on in treating of its causation. In vocal cases it appears to be purely of the nature of a glandular hypertrophy, the result of an over-loading of the vessels by misdirected force; in others by causes which diminish vaso-motor control. Concurrently with this overgrowth, the secreted material becomes changed in character, being first excessive in quantity, then deficient in fluid elements, and finally diminished in both quantity and moisture. This last condition represents the dry stage—*Pharyngitis sicca*—which has also received as synonymous the term *atrophica*, because at this period of the disease there is a distinct wasting of the mucous membrane and of the glandular structures of the diseased region, the atrophy being limited to the posterior wall of the pharynx, and to the naso-pharyngeal cavity and its contents. There is little doubt but that this atrophy is an advanced stage of the hypertrophic inflammation, and never occurs as a primary affection, though the process does not attack all parts equally; and wasted tracts will often be observed side by side with hypertrophied granulations.

There is a variety of pharyngitis which has not been described by writers of this country, but has for some years been denominated by Continental specialists as *Pharyngitis lateralis hypertrophica*. This term is not to be confounded as simply representing a condition opposed to that of atrophic pharyngitis, since it is limited by its sponsors to inflammatory thickening of the lateral bands. Since my attention was drawn to it, I have been on the look-out for such a lesion as representing a separate variety of pharyngeal inflammation, and my impression is that its claim to this distinction has been somewhat exaggerated. Nevertheless it is certainly true that in obstinate cases of chronic pharyngitis one may sometimes see a persistent redness with swelling, either continuous or beadlike, of the tissues immediately behind the posterior pillars, in the situation of the salpingo-pharyngeal fold; and I have observed this condition particularly in those cases in which the inflammatory process has extended

along the Eustachian tube, and has led to defect of hearing. But I hardly think that such a lesion is ever seen as an early or separate manifestation of a chronic pharyngitis. In my judgment it simply represents a variety of degree, or an advanced stage of the general pharyngeal inflammation. Nor, to anticipate somewhat, have we found it necessary to advise—as is done by our Continental *confrères*—the cutting away bodily by the knife, or *wholesale* destruction by the cautery, of these more or less pronounced hypertrophies of normal structures.

The accompanying drawing (Fig. CIII.) illustrates this condition. It will be seen that with the exception of a few granulations in the centre of the posterior wall, the inflammation is confined to the parts above indicated. The subject was a clergyman, aged forty, who had been under my care four years previously for chronic relaxation of his uvula, and varix at the base of the tongue. The uvula had been reduced and the varicose veins destroyed by galvano-cautery, and the cure had been confirmed by a course at Aix-les-Bains. From that time the patient had not suffered, but for eighteen months he had been without a curate, in addition to the fact that his church was a large one. He confessed that he had used his voice on several occasions with great effort. The immediate cause of his breakdown was the performance of four services without any aid in one day, eight days previous to his visit. On his coming to me his voice was almost entirely gone, and in consequence of peripheral irritation of the superior laryngeal nerve, there was almost constant spasmodic cough, which had prevented him from sleeping for three nights. He also experienced pain and a sensation of rawness; this last being produced, as he thought, by the incessant cough.

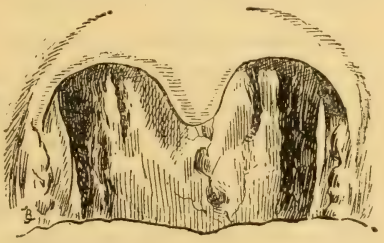

FIG. CIII.—CHRONIC PHARYNGITIS LATERALIS.

Allusion has been made to the influence of tobacco in producing chronic pharyngitis, and the subject has received detailed discussion by me in a separate monograph already quoted. It is of interest to record that [13] Ramon de la Sota, of Seville, describes several varieties of pharyngitis, which he considers as the direct pathological effects of the action of tobacco. They are of three kinds: (1) An *erythema*, occurring for the most part in persons who do not smoke excessively, or who, without smoking, are habitually accustomed to an atmosphere charged with tobacco-smoke. He has often witnessed this appearance in the case of ladies whose fathers, husbands, sons, or brothers are always smoking in their presence—as is the custom in Spain, where one does not deprive himself of his cigar either at table, in the drawing-room, or even in the bedroom. This observation is in direct contradiction to the less practical suggestion of Cohen, founded, presumably, on less extensive experience, that 'a cause of this

kind must be very infrequent in females, even in regions where women smoke.' (2) The *vesicular* form, met with in those smoking strong cigars, and who also chew. This condition is one of some acuteness, lasting about a fortnight, and then returning to a chronic erythema, or proceeding to the more advanced stage, (3) the *granular* form, which is observed not only in inveterate smokers, but in the makers of cigars and cigarettes, who live constantly in an atmosphere saturated with the dust and emanations of the tobacco-plant. It is also seen in snuff-takers. The special symptoms are a constant dryness, with persistent desire to clear the throat of a foreign substance and a steady deterioration of voice, which becomes veiled and toneless.

SYMPTOMS: A. FUNCTIONAL.—The **Voice** is hoarse, often jerky and altogether out of control. This is not from any want of power of co-ordination of the laryngeal muscles, nor often from any congestion of the vocal cords, which condition may or may not be present, but from spasm of the pharynx, and by irritation of the superior laryngeal nerve from a similar condition of the tensors of the vocal cords. The voice becomes very quickly fatigued, and suffers deterioration the longer it is exercised, so that a clergyman after his third service will hardly be able to speak above a whisper, and will remain quite hoarse for a day or two. Such trouble is more frequent in those subjects who use the voice only occasionally; thus, a clergyman having daily service, or a barrister in full practice, will be less liable to be affected than he who works the voice on Sundays only, or who makes but occasional harangues.

The *singing voice* loses in power at either limit of the register, and is frequently out of tune, of which the patient is conscious.

Respiration.—Oral respiration is unaffected, but nasal breathing is often impeded on account of the glandular hypertrophy extending to the vault of the pharynx, and moreover, in the great majority of cases, by actual intra-nasal disease. Breath-taking, in use of the voice, is generally described as laborious and painful. Inspiration is often shallow and inefficient, and control of the breath in intonation is inadequate.

Cough is frequent, irritable, and hacking, with expectoration of pellets of mucus from the supra-glottic portion of the larynx; and with occasional streaks of blood from the naso-pharynx; epistaxis sometimes occurs, and gives marked relief to the local symptoms.

Deglutition.—The patient experiences a frequent desire to swallow, the sensation arising not only from the presence of quasi foreign bodies, but also from an impulse to get rid of accumulated

mucus. Pain is experienced in swallowing hot fluids and piquant dishes.

The **senses** of **smell** and of **taste** are but very slightly affected, even when the disease has extended to the naso-pharynx; nor when the nostrils are obstructed is there often impediment to the odoriferous particles reaching the olfactory 'places,' the respiratory portion being that generally implicated.

Hearing is frequently impaired, from the collection of viscid secretion about the pharyngeal orifices of the Eustachian tubes, and occasionally from extension of the congestion or inflammation to the middle ear.

Pain is by no means a constant or ordinary symptom of chronic pharyngitis independently of the fatigue experienced on functional exercise, but occasionally the sensation of a foreign body and the discomfort of spasmodic muscular contraction is so extreme as to constitute real distress, and to even prevent the patient resting at night.

B. PHYSICAL.—With regard to the local condition of the surface in this disease, some authors describe it as one of ulceration with granulations. This is a mistake; there is no ulceration. There is frequent depression from atrophy of some portions of the submucous tissue, with elevation of other parts from presence of weak granulations, but nowhere is there actual loss of surface-tissue. This atrophy of submucosa is particularly noticeable in the track leading up to the mouth of the Eustachian tubes (showing as a broad whitish path on either side, Fig. 19, PLATE II.), the whole of the rest of the surface being covered with granules of varying sizes.

Colour.—The mucous membrane is always congested, but not always uniformly so; thus it is very common to see only the anterior arch and the lower part of the posterior pillars heightened in colour, while the rest is normal (Fig. 14). Where, as in this case, the disease is chronic, the whole mucous membrane is seen to be traversed with injected capillaries, or the whole surface may be red and the submucous tissue so infiltrated as to greatly interfere with nasal respiration, as in PLATE II., Figs. 13 and 15. When the disease is advanced to the granular stage, the posterior pharyngeal wall is seen to be uneven in surface and mottled in colour, with numerous strongly-marked tortuous lines of engorged veins and capillaries (Figs. 18 and 19); this same varicose condition extending in many cases to the vessels at the base of the tongue. The pillars of the fauces—sometimes anterior or posterior separately, and often both—are usually red, with whitish tracks

close to the posterior arch, as above mentioned, leading towards the orifice of the Eustachian tubes (Fig. 19). The enlarged glandules appear as red, pale-rose, or yellowish semi-transparent prominences. The depressions are often covered with frothy saliva or more or less tenacious mucus. In the dry or atrophic variety, this mucus is often of a brownish or greenish colour (Fig. 112, PLATE XIII.). In the case of snuff-takers, and in patients exposed to work in atmospheres charged with solid particles, as sweeps, miners, and coal-heavers, the coloration of the back of the throat will be influenced by their presence.

Form and Texture.—Alterations of form are but of surface character. Deposits are often seen on the uvula which look like tubercles: they are merely caused by an arrest of the glandular secretion, and are not nodules of tubercle. This condition is illustrated in PLATE IV., Fig. 32. Attention has already been drawn to the thickening behind the posterior pillars in the lateral hypertrophic variety.

Secretion of the glands and glandules is at first excessive, and there is considerable increase of fluid in the mouth, so that the patient complains that when speaking he does not know how to get rid of his saliva. Very speedily, however, with continuance of stimulation, the ordinary catarrhal changes take place, the mucus becoming more viscid, tenacious, and even muco-purulent. Lastly, in some cases, the glandular tissue becomes worn out, as it were, atrophy of the mucous membrane ensuing, and the throat exhibiting a dry glazed condition, giving rise to the state already described as *pharyngitis sicca* (Fig, 37, PLATE V., and Fig, 112, PLATE XIII.). The secretion is in such circumstances so tenacious that it requires forceps to remove it, or free rubbing with a firm cotton-wool brush; but as these proceedings are likely to lead to hæmorrhage, and possibly to erosions or ulcerations, it is better to soften the vesicated coating by emollient sprays when it is desired to clear it away. When this dryness exists, fœtor of expired breath is usually noticed. This symptom is more especially to be observed when the atrophy extends to the naso-pharynx; and the cause of the fœtor is not, as was formerly supposed, due to ulceration or to bone-disease, but to putrescence of the retained mucus. In many cases of *pharyngitis sicca* not extending to the nares, there is no mal-odour of the breath. Quite independently of any of these explanations of the mode in which dry throat occurs, it may be laid down almost as an axiom that a patient who awakes in the night with dryness of tongue, mouth or throat, is the subject of a

temporary or chronic obstruction of the nares, and that the discomfort is due to open-mouth breathing.

C. Miscellaneous.—The digestive system is always disordered. In numbers of cases, disturbance of the portal circulation, which is an exciting cause, is increased with the advance of the disease. Dyspepsia, which is so frequent an accompaniment of pharyngeal disorders, is in most cases a result rather than a cause. It is probably due to constant deglutition of disordered mucus favouring the accumulation of flatus in the stomach. But it is likely also that the connection of the glosso-pharyngeal nerve with the vagus may in some measure account for the gastric derangement. Pain and fatigue in breath-taking would also be thus explained, while irritation of the superior laryngeal nerve would account for inability to produce high notes, and for the inequality and impurity of tone experienced in this condition independently of congestion of the larynx. There is sometimes a concurrent chronic laryngitis, but in the majority of cases laryngeal congestion does not extend to the covering of the vocal cords or ventricular bands.

Prognosis depends first on a correct recognition of the cause by the physician and on prompt treatment; secondly, on the determination of the patient to follow out directions as to its prevention when a cure by suitable therapeutics has been established. This last is happily not difficult, though the course of treatment is often tedious.

Treatment: **Constitutional.**—Encouragement to free secretion from the alimentary canal by mild saline purgatives, such as Friedrichshalle Bitter Wasser, Hunyadi-Janos, or Pullna water, will be found of great value. Iron and vegetable tonics are of use, and may be advantageously combined with aperients (Form. 95, 96, 97, 100, and 101). A course of arsenical waters will in many cases be beneficial, especially those of Bourboule, by Mont Dore, which was first brought under notice and prescribed in England by the author very many years ago.

Local.—The topical application of astringents and the use of astringent or expectorant lozenges is often of service where the congestion is but slight (Form. 12, 16, 17, and 18), but when there is capillary engorgement with granulations I have seldom found such measures sufficient for the purpose, unless preceded by destruction of the enlarged vessels which supply blood to the hypertrophied lymphoid glandules, these constituting the so-called granulations. On these vessels being divided and obliterated by means of a fine galvano-cautery point, the prominences will be seen within

a very short time to shrivel up and disappear. In obstinate cases it is necessary to scrape the granulations with a curette. Where the galvano-cautery is not available, the same end may be obtained by incising the vein transversely with a long-pointed knife or lancet, and then applying a fine caustic point, with a little pressure, to the cut spot. When there exist bands of inflammatory hypertrophy, light scoring with the galvano-cautery point will bring about their reduction. Thermal cautery by the Paquelin process, or by wires heated in the fire, is a very inferior method to the galvanic, irritation spreading further beyond the point of application, and the eschar being altogether more 'angry,' and less healthy in character. Many laryngologists advise destruction of the granules by caustic pastes (Mackenzie), by cautery wires (Michel), by blunt cautery-knives (Reisenfeld). Such a plan does, however, but treat an induced effect, and cannot remove the local pathological cause. Among topical applications recommended by various authors are nitrate of silver, chloride of zinc, sulphate of copper, perchloride of iron, etc. (Form. 60, 65, 61, and 62). Pharyngeal sprays of the same character may also be employed in mild cases, the strength of the solution being not more than a fifth of that employed with the brush (Form. 47). Simple alkaline or emollient applications are to be preferred to mineral astringents; and in many cases great relief to the symptoms and benefit to the diseased condition is afforded by sprays of cold water.

For impairment of the hearing, application of the air-douche by catheter or Politzer bag will usually be found effectual in clearing away secretion and maintaining patency of the Eustachian tubes. When, however, the disease has extended into the naso-pharynx, causing congestion and thickening of the coverings of the turbinated bones, with disorder of the mucous secretion, cold inhalations of nascent ammonia by the nostril as well as by the mouth, the use of the posterior nasal douche, and local applications to the nasal passages are called for. These points will receive fuller consideration in the chapters devoted to nasal affections.

In very many cases, relaxation of the uvula, brought about by the same causes as the complaint of which such a condition is but a symptom, will continue to keep up or to re-induce local irritation, and must then be effectually treated. This subject will be considered under the special heading of affections of the uvula.

Hygiene.—The principal injunction is to point out how to avoid recurrence. Naturally the first indication is to establish actually free nasal respiration; and employment during sleep of a 'contra-

respirator,' or other apparatus for keeping the mouth closed, a measure warmly advocated by Professor Guye of Amsterdam, will be necessary to overcome the habit of mouth-breathing at nights. Those who have over-used or abused the voice must be compelled to give it rest for a time, and should be warned that unless they desist from its exercise under unfavourable conditions, a relapse is certain to occur. A few simple lessons in the first principles of respiration in relation to elocution are often most necessary. The use of alcoholic stimulants and tobacco should be interdicted, as well as the taking of condiments, hot spices, etc. Any coexisting diathesis, as the darthous, herpetic, scrofulous or tuberculous, must receive its appropriate treatment, and a course of waters at Vichy, Mont Dore, Cauterets, or Aix-les-Bains, according to the constitutional condition, may greatly assist in consolidating a cure. In some subjects, in whom the catarrhal influence is strong, it may even be advisable to recommend the patient to pass a winter or two in the South of France, Italy, Algiers, or Egypt. It is necessary, however, to insist with Mandl that such measures are only useful when 'not only the inflammatory phenomena but also the granulations have disappeared.'

ULCERATION OF THE PHARYNX.

Ulceration of the pharynx seldom occurs as the result of a simple angina. It is found, however, as a sequel of the form of pharyngeal inflammation known as hospital sore-throat, or as the result of a specific dyscrasia, such as syphilis, scrofula, cancer, tuberculosis, lupus, or lepra, these causes occurring in the frequency in which they are here enumerated. Finally ulceration may be the sequel of wounds from sharp-pointed foreign bodies, which have become accidentally lodged in some portion of the tract, or from corrosive poisons, scalding fluids, etc., accidentally swallowed.

PRIMARY SYPHILIS OF THE PHARYNX.

This is very rare, though buccal and faucial chancres are not so uncommon. A few cases have been reported of primary sores in one or other of the tonsils, and fewer still behind the anterior faucial pillars, though [14]Krishaber has mentioned an instance of a chancre on the lingual surface of the epiglottis. It is stated that the sores are hard when on the lip or buccal lining,

soft on the tonsil—a dictum not quite consonant with modern views of duality. The etiology is that of direct contact with a primary sore of the part on which the chancre is situated. Diagnosis is not often difficult if the practitioner's attention is drawn to the local lesion before the manifestation of constitutional symptoms. The only diseases for which it might be mistaken are tubercle and epithelioma. Treatment, which must be directed on general surgical principles not necessary to here detail, will generally clear up doubts that may arise as to the nature of the ulceration.

SYPHILITIC ULCERATION OF THE PHARYNX: SECONDARY SYPHILIS (Figs. 20, 21, 22 and 23, PLATE III.).

The affection of the pharynx occurring during that stage of syphilis known as the secondary—that is to say, in a period embracing about a year after exposure to the primary infection—is not really an ulceration at all, though there may be, and often is, erosion of the mucous membrane. The condition is looked on by nearly all writers as a manifestation of constitutional disease; but [15] Kaposi states that the papule and the broad condylomata may convey contagion, reproduce their kind, and in the infected individual be followed by secondary symptoms. He believes that in this manner children often become tainted through suckling from nurses who have a papular syphilide upon the mamma, and that when thus acquired, the affection of the infant is often mistaken for hereditary disease. I have recently seen such a manifestation in the fauces of an adult patient who had not contracted primary syphilis *in coitû*, but acknowledged to have absorbed the poison by direct contact of the lips with the vulva of an infected person. He states that he has not, to his knowledge, had a primary sore. I have also at present under notice a case of a single lady in whom it is impossible to suppose any existence of acquired cause, and she is beyond the age of liability to a secondary manifestation of inherited origin. Diagnosis was made solely on the objective evidences in the throat (Fig. CIV.), and was confirmed by Dr. Lefferts, of New York, and by Mr. Jonathan Hutchinson.

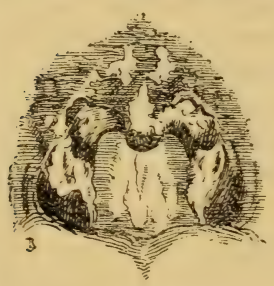

FIG. CIV.—SECONDARY SYPHILIS IN THE FAUCES.

The secondary manifestation of syphilis in the pharynx is

characterized by the presence of symmetrical congestive patches (erythema) submucous infiltration, and mucous tubercles, followed by exudation in the form of *plaques*, or by formation of condylomata, on the pillars of the fauces, tonsils, velum, and uvula, as well as on the lining of the buccal cavity, and on the edges and tip of the tongue. The disease may extend from the fauces and naso-pharynx to the Eustachian tube, and may also be present in the anterior nares; but it seldom attacks the posterior pharyngeal wall.

These *plaques* appear in the pharynx—itself of normal hue, or but slightly congested and swollen—as bright red crescentic or circular blushes, in the centre of which may be seen a white opaline spot, with an appearance very like that presented by what artists call 'glazing.' As the disease advances, this opaline glazing becomes thicker and greyer, and its surface looks as if in folds. When appearing on the tonsils, the characteristics of the *plaques* are less marked, as these glands become simultaneously hypertrophied and inflamed, and the products of their secretion, whitish-grey in colour, may cause some confusion. If the disordered epithelial covering of these *plaques* becomes detached, superficial vertical cracks or erosions can be noticed.

The SUBJECTIVE SYMPTOMS of secondary syphilis of the pharynx are often not well marked, and differ but little from that of a common sore throat. The principal sensation is an irritation and some pain in swallowing, this last sign varying greatly in different individuals.

OBJECTIVE SYMPTOMS.—The strong diagnostic point in secondary syphilitic manifestations in the pharynx consists in the local evidence of the disease. This is characterized by symmetry of the erythematous or mucous patches; not the symmetry of [16] Moxon, arising from the fact that the throat, in common with the rest of the body, is composed of two symmetrical halves, but in many cases by the veritable 'Dutch garden symmetry,' referred to by [17] Jonathan Hutchinson. This is well illustrated in all the figures of this disease in PLATE III.; especially in the first and fourth (20 and 23), where it will be seen that even on the uvula the patches are almost geometrical in symmetry; and such illustrations are, indeed, not uncommon, but typical.

A peculiarity of this disease, when seen very early in its course, is that the congestion, or at any rate some part of it, is masked, as it were, so that on first view of the throat the surgeon may be in doubt as to its specific nature If, however, the throat be a

little irritated by the finger, or with a brush, the distinctive character will at once be intensified, much in the same way as a skin-rash under similar circumstances will be more readily diagnosed by slight surface-friction.

The history of the case, and the co-existence of a squamous or roseolous eruption on the skin, will confirm the diagnosis. There is not unfrequently considerable rise of temperature on the first approach of this form of sore throat.

The usual period of the first appearance of these secondary manifestations is from six weeks to six months after the primary contagion.

PROGNOSIS is always favourable if the patient can be induced to persevere with treatment. The only complication of a serious character is extension of the disease to the larynx, which leads to a very troublesome form of inflammation with marked and obstinate huskiness of voice.

TREATMENT: **Constitutional.**—Some authorities are of opinion that the cases of syphilis in which the secondary manifestations are most severe are least prone to suffer from later ravages. As far as the throat is concerned, there can be but little doubt that this later immunity is in proportion to the efficacy and persistence of treatment during the earlier stages of the disease. Especially is this the case if a mild mercurial course, never reaching to the verge of salivation, is pursued concurrently with local measures. The tendency to salivation is much diminished if the patient is directed to carefully cleanse his teeth with more than usual vigilance, and especially after each meal, and if he use freely a detergent mouth-wash or gargle (Form. 2, 6, 8, 10, and 11). Chlorate of potash has proved superior in our practice to the solutions of alumina, in favour at Aix-la-Chapelle; and thorough cleansing of the teeth with a soft brush is insisted on by me as an important preventive of extension of the disease by local irritation. My favourite form for the administration of mercury at this stage of syphilis is in five-grain doses of the compound calomel, or Plummer's pill, twice or thrice daily. For some time past I have administered this combination of mercury in an effervescing lozenge, each one of which contains the ingredients of a five-grain pill (Form. 13). In obstinate cases inunction should be employed. In this view as to the importance of mercurial treatment I am supported by most syphilographers; and [18] Morell-Mackenzie probably stands alone among the throat-specialists in considering that 'secondary syphilitic affections of the pharynx

do not usually require any constitutional remedies.' There is, to say the least of it, an incompleteness in his argument 'that the non-use of mercury does not increase the risk of a further development of the disease,' because 'he has rarely met with tertiary phenomena in the throat among those whom he previously treated for the earlier manifestations' by 'local remedies' and without 'any specific treatment.' It only remains to be added that in very rare instances mercury is not well borne. Where this is the case, the patient is generally possessed of a scrofulous or tuberculous taint, and iodides of iron or of sodium, with cod-liver oil, will be preferably indicated.

Local.—This consists essentially in frequent caustic or resolvent applications, limited to the exact area of each patch of erosion or mucous deposit. In some cases iodine is of service, in others sulphate of copper is efficient. Iodoform has also been recommended, but offers no superior advantage over other applications sufficient to counteract its nauseative effects and disagreeable odour; it is now substituted in our practice by Iodol, which is similar in constitution, and though less powerful is inodorous. My own experience leads me to rely almost solely on the daily use of nitrate of silver in the solid form, applied accurately to each diseased patch. Even after all spots are healed, the patient should be carefully examined once or twice a week, and be treated with renewed energy on recurrence of the slightest relapse. Where there are cracks or erosions, and in the somewhat rare cases in which pain accompanies a 'secondary' sore throat, I have usefully substituted iodine and carbolic acid (Form. 63) as a local pigment. Where there is pain from extension to the ear, with deafness, inhalations (Form. 30, 31 and 32), used as described at page 104, are beneficial; when the mucus in the nares is apt to become inspissated, emollient applications (Form. 82 and 84) and nasal douches may be called for (Form. 73, 74, 75, 76, 77, and 78).

It is important to note that operations, such as excision of an enlarged tonsil, or ablation of an elongated uvula, should not be performed during the course of secondary manifestations in this region, since the raw surface is almost sure to take on afresh the diseased condition.

Dietary and Hygienic.—The diet must be non-irritant, and, both on general and local grounds, influences calculated to induce catarrh must be guarded against. Warm baths, with free use of soap, and Turkish baths are useful aids towards elimination of

the poison. Smoking should always be interdicted. Too much care cannot be enjoined against the possibility of communicating the contagion to others.

TERTIARY SYPHILIS (Figs. 24, 25, and 26, PLATE III.; Fig. 17, PLATE II.; Figs. 39 and 40, PLATE V.; and Figs. 109 and 110, PLATE XIII.)

The tertiary form of syphilis, which occurs in the pharynx at a period of from two to five years up to any length of time after primary infection, is characterized by true ulceration or loss of tissue, and is, according to modern views, always the result of degeneration of gummatous deposit. The ulceration may be, and often is, confined to one spot, or there may be several ulcers concurrently (Fig. CV., and Fig. 110, PLATE XIII.). In the earlier stages, ulceration is generally confined to the pillars of the fauces, especially at their junction with the tongue, to the uvula, and particularly to the velum.

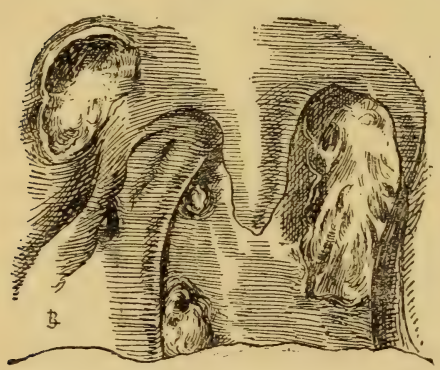

FIG. CV.—TERTIARY ULCERATION OF SOFT PALATE AND PHARYNGEAL WALL; PERFORATION OF RIGHT FAUCIAL PILLAR.

This last-named part, being of soft, loose structure, and bounded on both sides by mucous membrane, offers little resistance to its destructive changes, and yields rapidly to the inroads of the disease. In this situation, a red boggy patch is often seen on the buccal surface, which will, if unchecked, speedily lead to perforation. In such a case the ulceration has commenced on the posterior surface of the soft palate, and may often be seen and treated with the rhinoscope before perforation has taken place (Fig. 40, PLATE V.). Ulceration also occurs, generally in the median line, either at the junction of the soft and hard palate, or over the hard palate itself, and may also often be found just behind the upper incisor teeth.

The accompanying drawing—Fig. CVI. (see also Fig. 109, PLATE XIII.)—represents a central perforation, the result of recrudescence of specific inflammation, and was taken in February, 1879, from the throat of a patient, aged twenty-five, who had been formerly a private in the Grenadier Guards, and had contracted primary syphilis five years previous to coming under my notice. In the latter part of 1877 his palate and nasal bones became diseased, and 'eleven separate pieces of bone' had been extruded. His present attack had existed for five weeks before his visit. There was but slight facial deformity, but the nostrils which communicated with the palatal opening were ulcerated, and roughened bone could be felt with the probe.

It is seldom that the posterior wall of the pharynx is attacked by ulceration earlier than five years after the first infection ; but I have seen a few cases in which the primary infection had occurred less than three years previously. When the ulcer has once formed, it spreads rapidly, and its secretion, composed chiefly of epithelial detritus and pus cells, contains highly septic properties. The edges of the ulcers, be they round or irregular, are bounded by a deep-red halo, probably caused by the escape of colouring matter of the blood from compression of the vessels by cell-infiltration. When the tongue is ulcerated, it is usually in the median line, or as longitudinal fissures. As the ulcers heal, the surface assumes a peculiar bluish glazed appearance (Fig. 26, PLATE III.). In both secondary and tertiary syphilis a complaint is often made that the tongue feels too large for the mouth, and on examination this organ will be frequently seen indented by the teeth. Ulcerations of the edges of the tongue are often excited by irritation of decayed stumps of the teeth.

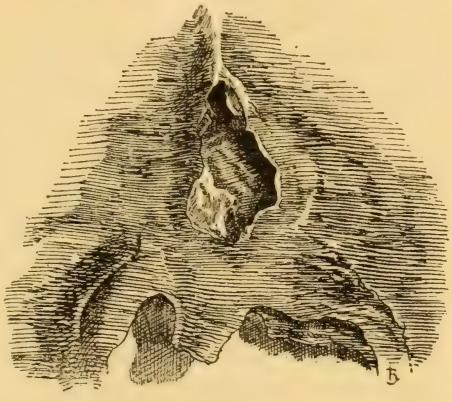

FIG. CVI.—TERTIARY SYPHILIS ; CENTRAL PERFORATION OF HARD AND SOFT PALATE. (See also Fig. 109, PLATE XIII.)

The SUBJECTIVE SYMPTOMS of this disease are frequently not very well marked when the pillars of the fauces only are involved, since pain, at least in any proportion to the mischief, is but seldom experienced ; when, however, there is perforation of the palate, or the velum or uvula sloughs away, a characteristic result is impairment of voice. This is due to loss of power to shut off the mouth from the naso-pharynx during articulation. From the same cause the greatest inconvenience is experienced in swallowing fluids, which pass into the nasal cavity and are ejected by the nostrils. When the posterior wall of the pharynx is attacked, the ulceration may commit most fearful ravages, extending upwards into the nares and downwards to the epiglottis. It may be noted, however, that syphilitic ulceration of the larynx, except of the epiglottis, occurs at a much later period than in the pharynx.

DIAGNOSIS.—The history of the case, the post-cervical glandular enlargement, absence of sympathetic induration of the parotid,

submaxillary or anterior cervical glands, the comparative freedom from pain, and above all, its amenity to appropriate remedies, will distinguish this disease from cancer, the only malady with which it is likely to be confounded.

PROGNOSIS.—This is almost invariably favourable under suitable treatment, although the patient may have been reduced, as often happens, to extreme emaciation. A co-existent scrofulous diathesis is, however, most obnoxious to the success of remedial efforts. The danger of hæmorrhages and necroses of bone in the acute stage, and of cicatrization, leading to adhesions and stenoses, as sequelæ, must not be forgotten when forming a prognosis. These adhesions sometimes give rise to very grotesque appearances, one of which is illustrated in the accompanying figures. Another may be seen in the coloured PLATE II., Fig. 17.

TREATMENT: **Constitutional.**—This will consist in the administration of iodide of potassium in 3-grain to 10-grain doses during active ulceration. Some patients are peculiarly susceptible to the action of iodine when combined with potassium. It has, however, been noticed, I think, by Mr. Hutchinson, that where this is so, the desired effect is obtained with very small doses of the drug. If in such cases the tendency to coryza be not counteracted by the addition of ammonia or of tincture of nux vomica, iodide of sodium should be substituted. The atomic weight of sodium being less than that of potassium, a smaller dose of the former may be administered. Certainly all soda salts are less depressing than those of potash. When the acute attack is past, the prolonged exhibition of perchloride, biniodide, proto-iodide, or bicyanide of mercury, in small doses, is all-important as a tonic, and as a prophylactic against future relapses (Form. 91, 92, 104, and 105).

Local.—Until ten years ago I was in the habit of treating all these tertiary ulcerations by the daily local application of nitrate of silver, of acid nitrate, or cyanide of mercury, or of sulphate of copper, the first-named being preferred; and such a plan I would still recommend under the ordinarily available opportunities of general practice. I have, however, met with such marked success, both as to rapidity of cure and freedom from recurrence, from the employment of the galvano-cautery, that this measure has largely superseded the use of the mineral caustics in my practice.

Whatever application be made, care must be taken to thoroughly cleanse the part of all coating of secretion over the ulcerations before the local remedy be applied.

Gargles of permanganate of potash, chlorate of potash, and carbolic acid, all aid in keeping the mouth free from accumulation of muco-purulent deposit (Form. 2, 8, 9, and 10). Ice is also frequently most grateful.

Local treatment must be pursued with the same constancy and persistence as in the secondary form of the disease, and success in these cases depends as much on the perseverance of the patient as on the energy of the medical attendant.

Dietary.—Pain in deglutition is not usually a prominent symptom in tertiary syphilis as affecting the pharynx. Many patients, therefore, while requiring to take food of a semi-solid character, or, in cases of perforation of the palate, liquids previously thickened, need not, as a rule, be restricted in their dietary, except so far as the general prohibition of condiments and of fluids at high temperature (so frequently insisted upon in these pages), extends.

FIGS. CVII. AND CVIII.—ADHESION OF UVULA TO FAUCIAL PILLARS, SHOWING DIFFERENCE OF APPEARANCE IN STATE OF REPOSE AND OF CONTRACTION ON INSPIRATION. A FRESH ULCER CAN BE OBSERVED IN THE SITUATION OF LEFT TONSIL.

It is to be remembered that in the healing of these pharyngeal ulcerations, cicatrization, with much plastic exudation, is occasionally followed by contraction and constriction of the pharynx, for the dilatation of which mechanical or surgical measures may be advisable. And on this account it may be noted that no morsel of tissue, seem it to be ever so lightly attached, should be separated by the knife ; for it is impossible to say how useful this small atom may be, as a starting-point for healthy action, when the reparative process is once set up.

Whenever cicatrization, leading to adhesion of the soft palate to the wall of the pharynx or to one side or other of the fauces (Figs. CVII. and CVIII.), takes place, nasal respiration is obstructed, the sense of smell is impaired, the patient experiences great difficulty in clearing the nasal passages, and the disagreeable tone of voice is but too frequently a permanent witness of his malady.

In some instances fragments saved from the destructive ulceration, becoming hypertrophied and separated, appear as distinct new growths (Figs. 25 and 26, PLATE III.; and Fig. 17, PLATE II.). When loss of tissue of the palate has been considerable, it is often necessary for the patient to wear some form of obturator.

A case was recently under my notice and treatment at the Central Throat and Ear Hospital, in which adhesive contraction took place of the tissues of the pharynx, fauces, and root of the tongue just above the level of the epiglottis. This led to an annular stricture, which barely admitted a goose quill. Some relief to the consequent dysphagia was afforded by division with a galvano-caustic knife and frequent passage of the bougie, but the patient left Hospital before any definite benefit was arrived at.

In all cases where the ulceration is healed, a more or less distinct and permanent stellate cicatrix is formed (shown in Figs. 17 and 25, PLATE II.), which often proves of great diagnostic importance in the later history of those cases in which doubt might arise as to the nature of laryngeal mischief. The same may be said of any perforations (Fig. 26) that remain unhealed.

CONGENITAL AND HEREDITARY SYPHILITIC ULCERATION OF PHARYNX (Fig. 27, PLATE III.).

This affection may make itself evident at a very early date after birth, and is usually manifested before the period of puberty. [19] John N. Mackenzie, in a valuable paper on this hitherto almost unexplored subject, states that nearly 50 per cent. of the cases occur within the first year of life, and as many as 33 per cent. within the first six months.

I have myself witnessed cases in adults, and indeed at almost all periods of life; but I have rarely seen a case in which there were symmetrical mucous patches in the pharynx of a congenital syphilitic patient, that stage having probably been reached and passed during intra-uterine life. The condition of the pharynx, as I have witnessed it, has more frequently, even at quite early periods after birth, been one of true ulceration; though I admit to having witnessed, in the same individuals, manifestations in the skin, cornea, etc., which were truly secondary in their character.

In this experience as to the occurrence of *deep ulceration* at such a very early period of life I am supported by John Mackenzie. The ulceration may, according to this author, occur in any situation; but its favourite seat is the palate, and especially the hard palate. When it occurs upon the posterior aspect of the latter, the tendency is to involve the soft palate and velum, and thence to invade the naso-pharynx and posterior nares. This is

well seen in Fig. CIX., taken from a child aged eight. Seated anteriorly, it seeks a more direct pathway to the nose. The next common localities are, in order of frequency, the fauces, naso-pharynx, the posterior pharyngeal wall, the nasal fossæ, the septum nasi, the tongue, and finally the gums. A peculiarity in these ulcerations is their centrality of position, and, furthermore, their special tendency to attack the bone and to eventuate in caries and necrosis. The ravages of the disease present the typical appearances that are found in the tertiary syphilis of the adult. The œsophagus is but very rarely attacked. It is with hesitation that I venture to differ from John Mackenzie on a clinical point in connection with this subject, but I can hardly agree 'that the invasion of the larynx may be looked for with the same confidence in the congenital as in the acquired form of the disease.' It is quite true that laryngeal manifestations occur occasionally without evidence of pre-existing pharyngeal lesions, but my experience tends to the view that, as a rule, the ulceration of congenital syphilis is limited to the palato-pharyngeal and naso-pharyngeal tissues, and that laryngeal mischief is a comparatively rare sequel.

FIG. CIX. — ULCERATION OF WALL OF PHARYNX AND OF SOFT PALATE IN HEREDITARY SYPHILIS.

A point of much clinical interest and importance which has occupied the attention of Continental syphilographers, and has been elucidated in its special application to the throat, by John Mackenzie, is the influence of some of the ordinary infectious diseases of childhood upon the progress of the inherited syphilitic affection. Sufficient evidence has been adduced to warrant us in saying (1) that while congenital syphilis affords no absolute protection against certain acute infectious diseases, its existence in the individual seems often, other things being equal, to mitigate their severity and exert a favourable influence on their course; and (2) that certain acute diseases, accompanied by an exanthem—as, for example, scarlatina and measles—favour the dissipation, at least temporarily, of the pharyngeal and other manifestations of the disease. On the other hand, with regard to diphtheria, when this affection supervenes during the existence of syphilitic lesions in the throat, the patient rapidly succumbs to the former disease—the existence of the syphilis apparently increasing the tendency to membranous formation.

SYMPTOMS.—Beyond the character of the ulceration, there are

other signs which make the diagnosis comparatively easy in the case of infants. They are well known to every practitioner. The chief are: impediment to nasal respiration and inability to take the breast; with coryza, leading to excoriations and ulcerations of the skin and of the alæ of the nose and the lips.

Prognosis is greatly influenced by the age at which the patient is attacked. The earlier the manifestation, the more serious are the results. Pharyngeal ulceration occurring within the first year of life is almost invariably fatal. Most disfiguring injuries to the palate, nose, and skin are often witnessed in those who survive.

In the majority of cases of deafness arising from inherited disease, doubtless the affection frequently invades the internal ear; but experience would seem to indicate that in many cases of even extreme deafness coming on concurrently with pharyngeal ulceration, the aural trouble is confined to the middle ear, and is a direct extension of the pharyngeal mischief, since in such a case inhalations, Politzer inflation, and other remedies directed to the tympanic cavity, will cure the deafness when the ulcer is healed. It is important to remember this, since surgeons are too apt to look on all cases of syphilitic deafness as hopeless. Of course, it is quite possible that middle-ear inflammation and cochleitis may co-exist.

Treatment.—The **general** treatment must, as far as circumstances permit, be carried out upon the same lines as recommended in the acquired form of the disease. Remembering, however, how much better children bear mercury than do adults, this drug may with advantage be administered with proportionately greater freedom. The best form is that of grey powder. Moderate inunction is also well tolerated. After the first few years of life, iodide of sodium with iodide of iron is a most efficient remedy.

I lay great stress on **local** treatment in children, even the youngest, by nasal douches administered twice or thrice a day, and always before attempts at suckling, by means of the nasal syringe (Fig. LXXIV.). The best solutions are those of chlorate of potash, borax, etc. (Form. 73, and 78). The after-application of an ointment of vaseline and eucalyptus-oil (Form. 82), of iodol (Form. 84), or of boracic acid (Form. 81), with the addition of red oxide of mercury ointment (1 to 16 parts), has in my hands been of more service than swabbing the passages of the nose and throat with caustics. In no circumstance do I employ nitrate of silver in infants; first, because I have seen two cases in which a prolonged course of such applications has resulted in permanent discolouration of the skin, and secondly, because nitrate of silver

locally applied has a decided tendency to favour the hyperplasia, which is already a sufficiently marked sequel of all specific ulcerations. In two instances of threatened destruction of the nose, I have seen the galvano-cautery arrest ulceration, where every other measure appeared to be useless.

Dietary.—Of the greatest importance is the nourishment of children who are the subjects of syphilis; and Cohen urges, with correctness, that a healthy wet-nurse should be procured, though 'a syphilitic wet-nurse is admissible, provided she is placed under specific treatment—that is to say, mercurialized.' If a child cannot suckle, no time should be lost in feeding it by the spoon, care being taken not to give the milk of such a strength as to endanger assimilation.

Hygienically, the syphilitic infant requires the greatest care in the way of warm baths, warm clothing, etc.

SCROFULOUS ULCERATION OF THE PHARYNX (Fig. 113, PLATE XIII.).

Scrofulous pharyngitis is described by [20] Isambert and others as a quite distinct form of disease; but I must confess to having never seen a case in which there were present the symptoms described by those authorities, unless there was a concurrent syphilitic or tuberculous dyscrasia. Many so-called cases of scrofula of the pharynx are also due to lupus. I am gratified to find that this disbelief of uncomplicated scrofulous ulceration, which I expressed in my first edition, is shared by such accurate observers as Schech, E. Wagner, and John Mackenzie. The last writer affirms that 'there is no just ground for belief in an ulcerative scrofulide of the throat. It needs only the most superficial review of the writings of those who maintain its separate existence to show the utter confusion which prevails as the result of erroneous views, handed down among the traditions of an obsolete pathology.'

To prevent misunderstanding, it may be as well to state that I do not deny a specific manifestation of scrofula in the pharynx; I only affirm that it is not usually one of ulceration. The form in which I have seen it exemplified is that of a low type of inflammatory thickening of the fauces, of the naso-pharyngeal passages, of the nasal septum, of the glands in the vault of the pharynx, and of the faucial tonsils, accompanied not unfrequently by a similar condition of the neighbouring lymphatic glands, which often undergo disintegration. There is also occasional necrosis of the turbinated bone.

While admitting that syphilis, if transmitted, must produce syphilis, it is quite certain that this disease, when manifested in a subject tainted with scrofula, has certain symptoms superadded. In such a case the local manifestations appear to arise in the glandules, which are hypertrophied and are liable to ulceration. The ulcerations are at the commencement superficial and indolent, but sooner or later perforation takes place, and many characteristics of a true syphilitic ulceration are presented, with others superadded. When remedial measures are applied, it is found that the disease does not respond, as might be expected, to the remedies applicable to either scrofula or syphilis separately. And here I may be allowed to adopt the words of [21] Sir James Paget: 'I would not venture to call the disease that may occur in a scrofulous person become syphilitic a hybrid one, and yet perhaps the term is not altogether wrong; but at least I would call it a mixed disease, and hold that syphilis inserted in a scrofulous person will, in its tertiary period, produce signs which it may be very hard to distinguish from scrofula—signs in which the characters of scrofula and of syphilis are mingled, and (which is very important) which require that the treatment of scrofula should be combined with the treatment of syphilis, in order to produce a fully successful result.'

A case of this nature is depicted in Fig. 113, PLATE XIII.

The drawing was taken from a female patient infected when pregnant with her first child some five years previously. She had had three or four miscarriages, but had not given birth to a living child. She was of a strongly marked strumous habit, and bore scars in her neck of glandular abscesses when a child. The ulceration was markedly tuberculated, and might be considered as almost lupoid. There was, however, a clear history of syphilis, and no other evidence of lupus.

TREATMENT.—In accordance with the above opinion, iodide of potassium should be combined with iodide of iron. Good food, fresh air, and phosphorized cod-liver oil are indicated. Sea-air and sea-bathing, and especially the bromo-iodine water of Woodhall Spa, Kreuznach or Challes, both internally, locally, and in baths, will be found very efficacious.

The galvano-cautery is particularly valuable in destroying this form of ulceration.

TUBERCULAR ULCERATION OF THE MOUTH, FAUCES, AND PHARYNX (Figs. 102 and 103, PLATE XI.).

To [22] Isambert and [23] Fraenkel, above all others, we are indebted for accurate description of this unusual affection, and for insistance on the important points of differential diagnosis necessary for its recognition.

ETIOLOGY AND PATHOLOGY.—Specific ulcerations as manifestations of tubercle in the mouth, fauces, and pharynx are much more rarely witnessed than in the larynx. But as to its exact frequency authors vary considerably. According to [24]Heinze, tubercle was found in the pharynx 14 times in 1,226 cases of pulmonary tuberculosis. This estimate approximately agrees with that of [25]Guttmann and Lublinski, who believe that only 1 per cent. of tuberculous patients are affected with its occurrence in the palate and pharynx. On the other hand, [26]Willigh noted only one case in the pharynx out of 1,317 collected cases of general tuberculosis. Personally, my clinical experience inclines me to agree with the estimate of Heinze and Guttmann. Tuberculous manifestations of the larynx occur in from 25 to 30 per cent. of all cases; and the number of such cases which have come within my scope of observation since my attention was more particularly drawn to the subject, ten years ago, by the articles of Fraenkel and Isambert, may at a low estimation be placed at 1,000. I have, however, seen but ten cases with pharyngeal, buccal, or lingual manifestations; in other words, in about ·33 to ·25 per cent. of all forms of tuberculosis, and about 1 per cent. of those exhibiting laryngeal complications.

Although there was formerly a general tendency—to which individually I plead guilty—to view all ulcerations in this region as syphilitic, it is not likely that, with present information, this mistake is now made by specialists; and I also agree with Guttmann that it is not probable that these cases are now overlooked, for the twofold reason that the extreme pain experienced by the patient at once enforces our attention to the local cause, and because, as a rule, tubercular ulceration is a late evidence of the general disease. As to this last fact, however, there is some difference of opinion. I have reported, in conjunction with [27]Dundas Grant, two cases in which the first manifestation in the mouth and fauces had occurred between two and three years previous to any chest attack, or even the suspicion of pulmonary disease. To these the following is of sufficient interest to be noted:

Matilda H., aged twenty, married at sixteen, is the mother of three children, of whom the youngest is fourteen months old, and is 'just being weaned.' She herself was an only child, and was born when her father, who is still living, was only nineteen. Her mother died before she could remember. The patient applied at the Hospital on November 15, 1886, on account of pain just at the entrance to the gullet. No pain was experienced in the fauces, but the distress was so extreme lower down that she 'would rather not swallow so as to not have the pain.' There was slight hacking cough, worse at night; and but little alteration of voice. The fauces were seen to be of characteristic paleness, and on the left tonsil, on careful inspection and with bright light, there was discovered slight creeping ulceration of a very superficial character, and with but scanty secretion. The tonsils were not in the

least enlarged, nor were the anterior pillars of the fauces attacked by the ulceration. The back of the mouth was full of frothy saliva, which was in itself a source of distress, as the clearing of it was almost as painful as its removal by swallowing. The larynx was healthy as to epiglottis and vocal cords, but the coverings of the arytenoids were very congested, and there was slight thickening of the inter-arytenoid fold. The posterior wall of the pharynx was seen, both by oral and laryngeal examination, to be ulcerated. The appearance of the ulceration was quite distinctive from that of either syphilis or cancer, and was characterized by the presence of large masses of weak pale granulations. There was no enlargement of cervical glands in any direction, and no part pointing to any other than that the case was one of tuberculosis. The stethoscope revealed nothing more than slight harshness of respiration, and somewhat impaired resonance at the right apex. There had been no distress of breathing, and neither night sweats nor diarrhœa. She had never had any illness affecting her chest or lungs. Some of the granulations were scraped away and submitted to microscopic examination, with the result of showing numerous bacilli of tuberculosis.

Isambert has given one case of a child aged four and a half years, in whom there were typical objective signs of pharyngeal tuberculosis, without any pulmonary symptoms whatever. Fraenkel's paper also contains records of cases which are adduced to support his theory that miliary tuberculosis of the pharynx is a disease which may attack apparently healthy persons, though it can hardly be admitted that his cases entirely support his thesis. [28] Bosworth is inclined to the same opinion as Fraenkel, that the disease is frequently primary; but in the only case quoted by him, 'examination of the lungs showed marked dulness, with broncho-vesicular respiration in the right interscapular region, eight weeks after the first symptom of throat trouble was manifest, and four weeks after the graver form of the disease of the fauces had set in.' On the other hand, the following case is a striking exemplification of the more general view that pharyngeal ulceration is a late evidence of tuberculosis.

J. J., æt. thirty-five, was admitted into the Central Throat and Ear Hospital, September 9th, 1886, on the recommendation of Mr. Wade, of Southampton. Although he had, on a previous occasion, eight or ten years ago, lost his voice for a time, his present illness only dated from September, 1885. It commenced with a severe cold in the head, followed by hacking cough and slight expectoration of thick phlegm, which was only freed after attacks of cough lasting for an hour, after which he would have rest for two or three hours. He lost his voice for eight or ten days, but almost entirely recovered from the illness in three or four weeks. All the symptoms returned at Christmas, 1885, and have not since subsided. From this date he has lost flesh. Pain and difficulty of swallowing were first noticed in March, 1886; about this time he gave up work, and though he has done a little off and on he has been an invalid ever since that time. Diarrhœa occurred in August. Has never spat blood, nor had night sweats. There was no history of syphilis. He had been married nearly four years, and his wife had given birth to two healthy children, and had had no miscarriage.

With the laryngoscope there was seen characteristic thickening of the arytenoid cartilages and vocal cords, but there was no ulceration or inflammation of the fauces or soft palate. Examination of the chest revealed feeble expansion, increased vocal fremitus, dulness, and tubular breathing at the right apex.

The patient was directed to wear an oro-nasal inhaler with the inhalant in formula 53,

and to take hypophosphites with Fowler's solution; liquid applications or insufflations of chloride of zinc and morphia (Form. 66 and 69) were employed daily. Under this treatment he decidedly improved, but on October 5th a shallow ulcer was observed on the left tonsil about the size of a threepenny-piece, which was judged to be tuberculous, though it did not cause pain, that symptom being manifested only at the orifice of the œsophagus. The ulcer healed after one application of the galvano-cautery on October 7th; cocaine having been previously used to mitigate the pain of that procedure.

The exact etiology of this form of the disease is difficult of determination, but there is the invariable element of a low state of vitality, with a resulting feebleness of recuperative power. Its occurrence as a primary manifestation of the tuberculous diathesis is at least as doubtful, but still as possible, as is that of a primary tubercular laryngitis. All arguments to this effect are met by the fact that no case is recorded of a patient dying with either disease in which the lungs have been found healthy; and in this connection we can but admit that the ear is less likely than the eye to detect early manifestations. My own belief is in accord with that of Schech, who has been forced to the conclusion that the pharynx is only apparently attacked primarily; in other words, that prior to the outbreak of pharyngeal tuberculosis, tubercular deposits exist in other organs, although the fact cannot always be demonstrated. But with the records of such observers as have been named, and in recollection of our own cases, it would be rash to assert that a primary tuberculous ulceration of the pharynx is impossible. Admitting so much, many local causes of a functional character may be quoted as exciting to the malady. In one of our cases,[29] the local irritation of diseased teeth, as evinced by the improvement following their extraction, was the exciting cause of a tuberculous ulceration of the gums and mouth, which long preceded pulmonary signs; and a chronic pharyngeal catarrh may be as much a factor of the disease in this region as is a long-standing and neglected laryngitis of laryngeal phthisis. The idea, first promulgated by very eminent pathologists, that the ulceration could arise from the irritation and destructive action of pulmonary sputa is less capable of being maintained as a cause of pharyngeal tuberculosis than when applied to the same disease in the larynx.

I have quoted the fact that Isambert has seen tuberculosis of the pharynx in a young child; and a few other similar instances of the disease in the young have been recorded. As a rule, however, it is a malady of adult life. The division of tuberculous ulcerations of the pharynx and fauces into acute and chronic is fanciful and without practical utility.

For further discussion of questions of causation and of the

morbid anatomy of tuberculosis in the throat, the reader is referred to the chapter on ' Laryngeal Phthisis.'

Symptoms: Functional or Subjective.—The **voice** is not, unless there be concurrent laryngeal mischief, affected in its phonetic character, but articulation is often impaired, and frequently becomes nasal. Exercise of the function is always accompanied by pain. The principal symptom is the extreme agony experienced in **deglutition**, whether of food or of saliva. The **pain** extends to the ear, as in cancer, by transmission through Jacobson's nerve, the glosso-pharyngeal and the auricular branch of the vagus. The suffering experienced is more constant and probably more acute than that of any other malady, and, as Schech states, patients will sometimes rather suffer hunger and thirst than endure the agony of deglutition. The senses of **taste** and of **smell** may be affected. The odour of the breath is very characteristically offensive.

Objective.—The appearance of tuberculous ulcers in the pharynx or on the tongue is very characteristic (Fig. CX.).

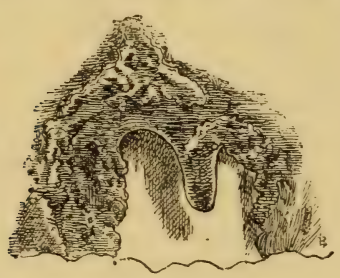

Fig. CX.—Tuberculous Ulceration of the Velum and Fauces.

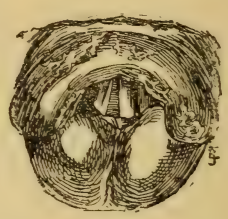

Fig. CXI.—Larynx of the same Patient (*see Chapter on Laryngeal Phthisis.*)

[The subject of these illustrations was a male patient, aged twenty-five, who had suffered for thirteen weeks from dysphagia, with return of fluids through the nostrils. His chest exhibited symptoms of commencing disease at the right apex.]

They are irregularly lenticular in shape, with ill-defined, eaten out and slightly raised margins of a pale yellow colour, and with but faintly hyperæmic areola. On their floor, which is shallow, may be observed several grain-like granulations or warty excrescences of pale pink colour, covered with thin unhealthy pus. The soft palate may be thickened, and the uvula enlarged with the semi-solid effusion peculiar to tuberculosis, submucous infiltration; but more frequently there is thinning and atrophy of these tissues. The mucous membrane generally of the buccal cavity and palate is of the characteristic pale-greyish colour to be later insisted on as pathognomonic of laryngeal phthisis; and studded about,

especially in the neighbourhood of the ulcers, may sometimes be seen small greyish nodules, to the caseous degeneration of which the ulcer probably owes its origin. Indeed, Schnitzler has published a case in which he diagnosed tuberculosis merely from the presence of such tiny greyish tumours upon the uvula and arch of the palate, when no point of ulceration appeared either in the pharynx or larynx, and when no disease of the lungs could be determined by physical examination. He excised some of the tumours which, examined by the microscope, proved to be true miliary tubercles. Later, typical tuberculous ulcerations made their appearance on the site of the patches in the pharynx, and the usual signs of pulmonary phthisis developed themselves. In one of my cases, ulceration of the tongue, and in another of the pharynx, existed two years and a half and three years respectively before any manifestation of pulmonary trouble could be recognised, though the ulceration was diagnosed and treated as tuberculous so soon as seen by Dr. Dundas Grant and myself. The later development of pneumonic symptoms testified to the correctness of our opinion. Cases have been reported of tuberculosis of the pharyngeal tonsil, and other portions of the naso-pharynx. I have not myself seen any manifestation in that region, but I have more than once had experience during the course of a pharyngo-laryngeal tuberculosis of a suppurative inflammation of the middle ear, which probably originated by extension of the disease along the Eustachian tube. The intense pain felt in the ear, as an almost constant sign of pharyngeal tuberculosis, but not specially characteristic of this form of inflammation, might well account for a non-recognition of such a condition prior to the occurrence of purulent discharge. It is highly probable that tuberculosis of the faucial tonsils is, as Strassmann (quoted by Schech) has observed, a common but unrecognised accompaniment of pulmonary tuberculosis. He believes that in such circumstances the symptoms are negative. The cases of M. H. and of J. J., which I have quoted, would support this view; but it is important to note that in neither of them was there any ulceration of the pillars of the fauces.

The DIAGNOSIS need never be doubtful if the practitioner is only alive to the possibility of its existence, as the only disease for which pharyngeal tuberculosis can be mistaken is syphilis in its tertiary form. [28] Bosworth has so well classified the distinctions between these two diseases that I adopt his grouping with only slight modifications and additions. He has added a third column of the differential signs of scrofulous ulcers, but since I do not recognise that disease I have omitted it:

Syphilitic Ulcers.	Tuberculous Ulcers.
Deeply excavated.	No apparent excavation.
Few granulations, and those highly inflammatory.	Much indolent granulation.
Deep red areola.	Faint areola.
Sharply-cut edges.	Irregular and ill-defined edges.
Distinct demarcation.	Demarcation indistinct.
Yellow purulent secretion.	Greyish, ropy mucous secretion.
Discharge profuse.	Discharge scanty.
Penetrating to deeper tissues.	Superficial, with lateral in place of deep extension.
No fever.	High fever.

To the consideration of these local differences are to be added those of the general history and emaciation, and of (possibly) concurrent evidences in the individual and family history.

With regard to **external** signs, the submaxillary, parotid, and lateral cervical glands, both deep and superficial, are often swollen and painful in tuberculosis, but are unaffected in syphilis. In the earlier stages of this last complaint there of course exists the well-known post-cervical glandular enlargement to be felt in the nape of the neck, but this condition is by no means so common in the later secondary or tertiary manifestations—those likely to be mistaken for tuberculosis. As far as the glandular evidences are concerned the disease might be more excusably mistaken for cancer; but examination of the ulceration itself, as well as numerous other symptoms, at once differentiates it. Nor is there the slightest justification for the suggestion that tuberculous ulceration of the fauces or pharynx has any objective symptoms likely to lead to its being diagnosed as diphtheria.

Temperature as a diagnostic point is of by no means the value that might generally be supposed; and I have not found the variations of such extent as is usual in ordinary cases of pulmonary phthisis. This is due, no doubt, to the inanition caused by the odynphagia, which, in its turn, contributes so much to the more rapidly fatal termination of the disease.

Lastly, diagnosis may be completed by examination for the tubercle bacillus, which can usually be obtained without difficulty from this region.

Prognosis is seldom doubtful. Whether such a disease as primary tuberculosis of the pharynx is or is not possible, it is beyond question that up to now no case has been reported of a cure. In this respect the pharyngeal disease offers us less hope than is beginning to obtain regarding pulmonary and laryngeal manifestations of the tuberculous dyscrasia, and partakes of the obstinate progress to a fatal termination of the same

disease in any part of the alimentary tract. The issue, in the light of an accurate diagnosis, may be surely foretold long before pulmonary and other more commonly recognised symptoms are far advanced; but it may be long delayed. For general guidance it may be stated that the prognosis is unfavourable as to duration of life, in proportion to the increase of the dysphagia, and the consequently diminished power of taking nutriment.

TREATMENT can, at the best, be but palliative. The indications are:

1. To counteract the general phthisical processes.
2. To give as much as possible functional rest.
3. To relieve the pain in swallowing.
4. To administer suitable nourishment.
5. To heal the ulceration.

Going briefly through all these points separately, it may be said that—(1) The hypophosphites and malt extracts, from their respectively special properties in aiding assimilation of meat and starch foods, are probably of greater service in pharyngeal than in most forms of laryngeal tuberculosis. Cod-liver oil, taken in combination with the two foregoing remedies, is generally of good effect, but is not always well borne. (2) Functional rest by disuse of the voice is equally important in palatal and lingual, as in laryngeal cases. Where dysphagia is extreme, administration of food by the œsophageal tube or *per rectum* is often called for, and if maintained for a few days will sometimes be attended by such improvement in deglutition that oral alimentation, thus rested, can be resumed. For this purpose of giving rest, in cases of dysphagia due to ulceration, it was first advocated by Bryson Delavan. It must be remembered that the passage of the œsophageal tube is in itself painful, and the pre-application of a 4 or 5 per cent. solution of cocaine is advisable. [30] Beverley Robinson lays stress on the advisability of rinsing the stomach with an alkaline tepid solution in those cases in which long restraint from food has led to distaste or disgust for nutriment. He also thinks it is often unnecessary to pass the tube far beyond the commencement of the œsophagus proper. The tubes should be of small calibre. (3) Relief of the pain in swallowing is to a large extent involved in (4) The form of nutriment to be prescribed. The food should be soft and thickened, and, as a type, I may allude to the raw egg, either beaten up with milk or wine, or preferably simply thrown whole out of the shell into a glass. This, flavoured with a few drops of vinegar, should be swallowed at a gulp, and so taken it acts both as nutriment and as a soothing and protective application. Oysters, thickened soups, cream,

milk, etc., will all suggest themselves as suitable in less extreme cases. As to the temperature of the food, cold fluids are better borne than hot, which always increase the pain. Sometimes ice is distinctly grateful and ease-giving. But probably tepid food will be most generally acceptable and less likely to either irritate the ulceration or to cause muscular cramp.

Of more purely medical modes of relief the application of a five or ten per cent. solution of cocaine shortly before food-taking has superseded all previous anodyne applications, such, for instance, as the morphiated glycerine of Isambert, which indeed, undiluted with water, I have found irritating rather than sedative. Nor have I found insufflation of either morphia or iodoform of service in pharyngeal ulceration. Prior to introduction of cocaine, I employed a solution of chloride of zinc and morphia (Form. 66). A preparation of benzoin, opium, and belladonna, mixed with yolk of egg (Form. 67), was of noted service in one case for which it was specially prescribed. I would still suggest these applications as alternatives of cocaine, when, as is not unfrequently the case after long-continued use, that drug has lost its effect, and the variation of the other mineral astringent solutions which are likewise mentioned in the list of Formulæ with addition of cocaine or morphia. Externally, hot or cold applications by means of Leiter's coil are one or other agreeable, according to individual proclivities. Belladonna and chloroform, and the application of chloral and camphor (Form. 57), are also amongst the external remedies worthy of trial. The sipping of barley-water or milk and water containing solution of morphia in very diluted proportions (not more than 1 per cent.) is of advantage in giving ease to both local pain and to distress of cough.

Lastly, is there any way or hope of healing the ulcerations? Applications of the zinc and copper solutions, combined with anodynes, have not been followed by any favourable results. Free application, with friction, of lactic acid, the granulations having been previously scraped by a curette, has been extolled by many, especially by Krause of Berlin; and my experience, which was but limited when I wrote my last edition, has confirmed me in the highest opinion of its value; the same may be said of menthol, as recommended by Rosenberg of the same city. In one case of lingual tuberculosis, and in one of tonsillar ulceration, the galvano-cautery rendered such good service that a trial of it can with confidence be recommended; and the more so, since with the introduction of cocaine the proceeding is not attended by such acute pain as formerly. After-pain there is little, for, as I have often pointed out, galvanic has antiseptic and healing properties unpossessed by any other form of actual cautery.

Employment of an oro-nasal inhaler, with some such antiseptic

and anodyne mixture as that mentioned in Form. 52 and 53, is of utility in relieving the disagreeable taste and odour of the breath, and when the disease has extended to the larynx or lungs, in checking cough and expectoration.

LUPUS AND LEPRA OF THE PHARYNX AND FAUCES.

The first of these diseases, when manifested in the throat, is so generally associated with extension to the larynx, that it will be described amongst the diseases of that region.

Lepra of the pharynx is of great rarity in this country, but by the courtesy of Dr. Dickson, I recently had an opportunity of seeing a few cases at the Leper Establishment, Robben Island, Cape Town. Its general history is similar to that of lupus, possessing, as it does, the two prominent characteristics of that disease, viz., that it is secondary to cutaneous manifestations, and that when it heals it leaves behind an indelible scar. The prognosis as to cure is in the last degree unfavourable.

NEUROSES OF THE PHARYNX AND FAUCES.

Nervous affections of the palate and pharynx are by no means rare, and occur as symptoms or as complications of a great variety of pharyngeal diseases. As in other regions, pharyngeal neuroses may be conveniently divided into impairment of the sensory and of the motor functions.

MOTOR.—**Anæsthesia** of the pharyngeal mucous membrane is said to occur in typhus and cholera, and is also common in general paralysis of the insane. From an investigation into the condition of the throat in fifty patients suffering from the last-named disease, made by [31]me in 1875, at the invitation of Sir Crichton Browne, it appears that the reflex excitability of the pharynx is markedly diminished from the beginning of the disease, and prior to development of motor symptoms. Anæsthesia of the pharynx may also be present in connection with epilepsy and as the result of paralysis of the glosso-pharyngeal or pneumogastric nerves. In all these cases the origin of the neuroses is central. Of peripheral origin, the chief is the insensibility accompanying post-diphtheritic paralysis, and, on cicatrization of syphilitic and other ulcerations. Lupoid and leprous cicatrices are said to retain their sensibility. Hysteria is another cause of pharyngeal anæsthesia. Finally, it can be induced by the action of ice, or of extreme cold otherwise applied, and of certain drugs, as chloroform, bromides of potassium, sodium, or ammonium, morphia, and especially of cocaine.

Hyperæsthesia can hardly be said to exist as a disease, but the presence of an elongated uvula, or other stimulus of irritation, may produce excessive sensitiveness of the part. In chronic

pharyngitis there is, so long as congestion remains, a decided increase of sensitiveness, due to reflex irritation, and it is a common impediment to laryngoscopic examinations and intra-laryngeal operations.

Paræsthesia or abnormal sensations in the pharynx are very common. Disagreeing with some other writers, they are always, in my opinion, symptomatic of some objective, but not always discovered, cause. The chief of such feelings are those of a heat, a pricking, a swelling, a weight, a straw, a hair, or other foreign body, and the rising of a lump in the throat (*globus hystericus*). One patient, an otherwise strong, hale farmer, complained of a feeling of intense cold with exacerbation on swallowing and after food-taking. As the result of examination of a large number of cases, made in conjunction with my colleague, Dr. Dundas Grant, when he was Registrar of the Central Throat and Ear Hospital, some seven years ago, I arrived at the conclusion that there are but very few cases of a purely hysterical character; and I read a paper on the subject at the International Laryngological Congress in Milan in 1880; and again before the Philadelphia Medical Society in 1887. The correctness of my views has since been confirmed by several independent and quasi-original communications.

FIG. CXII.—VARIX OF BASE OF THE TONGUE AND HYPERTROPHY OF THE LINGUAL TONSIL.

Fig. CXII. represents a typical portrait of lingual varix, which was taken from a maiden lady, aged fifty-two, sent to me by Mr. Hemming, of Notting Hill. She complained of pain in her tongue and back of the throat, with sensation of an obstruction, and cramps, which she believed to be rheumatic. She had become thinner, and dreaded malignant disease. She suffered from habitual constipation and rectal hæmorrhoids. Her throat-suffering dated from the menopause, which had occurred rather more than a year previously.

The following, in order of frequency, are the principal objective conditions to be found:

(1) **Varicose veins** at the base of the tongue, dependent (*a*) on a general or local vaso-motor neurosis, and associated in females with menorrhagia or amenorrhœa; and (*b*) on a similar condition as a result of alcoholism. Hæmorrhoids, varicocele and varix of the lower limbs are frequent concurrent evidences of the dyscrasia. To see this condition it is necessary to place the mirror high up in the throat. [32]Dickson considers varicosity of the ranine and lingual veins on the anterior under aspect, and at the side of the tongue, a diagnostic sign of value in relation to

thrombotic and hæmorrhagic lesions of the brain, and also to cardiac weakness.

(2) **Hypertrophy of the lingual tonsil**, a condition often associated with dyspepsia. Sometimes in this variety the epiglottis will become 'imprisoned,' as Cohen has termed it.

(3) Slight enlargement, or at least congestion and sensitiveness on touch, of the thyroid gland. In many instances in which there is but slight enlargement of the gland, the peculiar thrill of venous congestion will be felt on palpation of the thyroid region.

The etiological factors in the production of this overgrowth of the lymphoid tissues at the base of the tongue are apparently identical with those leading to enlargement of the other faucial and pharyngeal lymphoid glandular masses, namely, the contamination of the buccal fluids by micro-organisms and their irritating chemical products—the result of their life processes—in association with rheumatic and other diatheses. In corroboration of this statement, I may mention that I have often seen in septic and rheumatic anginæ, a complete blocking of the lacunæ at the base of the tongue, a precisely similar condition to that which in the faucial tonsils is erroneously described in even modern text-books as 'follicular inflammation,' and still more ignorantly as 'ulcerated sore throat.'

Undoubtedly these abnormal feelings are more common amongst females than males, but enough has been said to show that they must not on that account be dismissed as groundless fears of an imaginative or hysterical hypochondriac. Since I began to search for a cause I have found these cases yield to remedies appropriate to the circumstance, and my colleagues agree with me in finding them perfectly amenable to treatment. Although hardly to be considered as an abnormal sensation, mention may here be made of the taste of blood in the throat on waking from sleep. I have repeatedly assured myself that such an experience is always the result of an actual venous leakage, and a common symptom of varix.

TREATMENT consists in rectifying the irritant character of the oral secretions, and in removing redundant tissue by either the galvano-cautery—preferably the porcelain point—or with the galvano-caustic snare. Lunar caustic is an inefficient, and chromic acid a dangerous application in this situation. [33]Walter Fowler and others have reported cases in which this last remedy, so employed, passed into the stomach and caused collapse and other toxæmic effects.

That very evident diminution of swelling of the thyroid gland frequently results from this treatment as well as after removal of

hypertrophied faucial and pharyngeal tonsils, is a fact none the less remarkable than the subsidence of enlarged glands in the neck after rectifying morbid conditions of the mouth and throat.

Spasm of the **Pharynx** may to some extent be considered as a motor neurosis, but is often a subjective symptom. It is met with, independently of paræsthesia, in an extreme degree in œdematous and acute inflammations, and in hydrophobia. In its milder forms it may be due to incomplete mastication, arising from absence of teeth, or the imperfect 'bite' of an artificial set. It is to be distinguished from organic disease by the fact that the patient has difficulty, never actually amounting to inability, of deglutition, quite irrespective of the consistence or temperature of the food. An important diagnostic sign of this form of dysphagia, and not, I believe, previously noted, is the condition of the muscles of mastication. If the surgeon places his fingers over the masseter and temporal regions he will find that, on the patient making movements of mastication, those muscles are more or less atrophied, the result of disease. Not so in organic cases, where the teeth are perfect and mastication has been exercised even to excess. The œsophageal bougie or digital examination will complete the diagnosis. Spasm is also a symptom of chronic pharyngitis; and lastly, and above all, it occurs in the trouble known as *globus hystericus*, to which allusion has just been made.

Neuralgia, due to the same causes as those which produce similar disorders in other regions, may occur in the throat, and must be treated on general rather than on purely local indications. It is decidedly rare, but I have seen some cases of extreme and remittent pain analogous to neuralgia of the fifth or of the sciatic nerve, but without any local sign of surface inflammation, which by exclusion could be considered only as neuralgic, and which have yielded to remedies appropriate to that diagnosis. I cannot agree with [34]Schech as to the uniformity or even common association of such symptoms with hysteria. (See 'Neuralgia of the Larynx.')

Female patients are much more liable than males to these nervous affections, and will in such case generally be found to suffer either from menorrhagia or amenorrhœa.

Treatment of all neuroses of the pharynx must be directed especially to the removal of the cause. In pharyngeal **anæsthesia** of extreme character artificial feeding must be pursued, so long as there is fear of food entering the air-passages; faradization and subcutaneous injection of strychnia, with tonics of iron, quinine, and strychnia, are the principal therapeutic agents. Friction and possibly modified massage might be of value.

In **hyperæsthesia**, when it interferes with laryngeal examinations, removal of the cause, as in the case of a relaxed uvula, and modulation of the sensibility in those of pharyngitis, tuberculosis, etc., by anodyne applications, the chief of which is cocaine, are naturally at once suggested. Although trenching on the laryngeal portion of this treatise, it may here be conveniently remarked that the constant touching of the intra-laryngeal parts with the probe, as recommended by many authorities, for the purpose of rendering them accustomed to instruments preliminary to operations—as for removal of growths—is a procedure neither practised nor advocated by us.

The treatment of **paræsthesia**, as has already been suggested, depends essentially on a proper diagnosis and therapeutic action thereon. With regard to **spasm**, the same may be said. In the case of varix the enlarged vessels are to be destroyed by the galvano-cautery, cocaine being first employed. Where a battery is not available the acid nitrate of mercury is the most efficient caustic. It was held in great esteem by my friend Llewelyn Thomas.

When the teeth are at fault, it is most important to call in the aid of the dentist, not only for immediate and permanent relief, but because without doubt many cases of malignant ulceration commence with symptoms ascribed to purely functional causes. Faradization, by means of the œsophageal electrode (simply an elongation of the laryngeal instrument), is of possible service in restoring healthy muscular action. In one case that came under my care on the recommendation of Mr. Poyntz Wright, of Oldham, this treatment had been of no avail, and the patient recovered under the subcutaneous injection of ℥ij. to ℥iv. of the B. P. solution of strychnia.

Motor **paralysis of the pharynx** is usually of central origin, and may be due to injury or disease of the brain and pneumogastric, or in its peripheral form as a sequel of many wasting diseases, and especially of diphtheria. Paresis and paralysis of the velum is commonly associated with a chronic relaxation of the uvula, as well as of acute catarrhal inflammation of the fauces.

Treatment in the peripheral class of cases must consist in the exhibition of general tonic remedies, the application of local faradization, hypodermic injections of strychnia, and the administration of thoroughly soft, and, if necessary, artificially masticated food. The **prognosis** is favourable, except where the symptoms are due to centric causes, when the outlook is, of course, quite the reverse. Such cases are, however, considered

in systematic works on medicine, and do not here require further elaboration.

MALFORMATIONS, DEFORMITIES, AND MORBID GROWTHS OF THE PHARYNX.

[35]Cohen has noted a peculiarity, to which my colleague, Dundas Grant, has twice drawn my attention, namely, a separate mucous investment of the palato-glossus muscle in the anterior fold of the palate, leaving sometimes on one side, sometimes on both, an opening between the anterior and posterior pillars, which might easily be mistaken for ulcerative destruction of tissue. I cannot agree with a [36]recent writer that they are really of pathological origin, such as scarlatina or quinsy.

Dilatation of the pharynx—**Pharyngocele**—leading to the formation of a pouch, in which the food is apt to lodge, is occasionally witnessed as the result of enfeeblement of the constrictors. The condition gives rise to symptoms of discomfort rather than danger. The chief is that due to the lodgment of food in the pouch. The only danger is the possible passage of food into the larynx. But little is to be done in the way of treatment. After a time the patient often learns by peculiar movements of the throat, or by external pressure, to empty the sac; otherwise this is done by Nature herself whenever the receptacle becomes overloaded. Surgical treatment cannot be recommended.

The passage may be more or less constricted as the result of syphilitic cicatrization, and the canal may also be narrowed temporarily by an abscess. Both these two last-named conditions have been already considered.

I have found but very scant mention of another cause leading to narrowing of the lower pharynx, namely, angular curvature of the cervical portion of the spinal column. Such a case occurred in my practice, and, as it offers many points of diagnostic interest, may be briefly related.

The patient, a gentleman, aged fifty, came under observation October 23rd, 1877. He complained of continual snuffling and accumulation of phlegm, of fœtid taste and odour, dropping into the throat from the post-nasal passages. Deglutition was difficult, except with soft food and fluids. Respiration was very short; the voice had become feeble, and was occasionally lost 'as if there were no breath,' but on the occasion of this visit was thick and toneless, and there was evidently an obstruction to free nasal respiration. The special senses of hearing, smell, and taste were unaffected. Examination of the anterior nostrils failed to reveal, as was suspected, any evidence of a nasal polypus. On attempting rhinoscopy and laryngoscopy, a large tumour was seen to project from the posterior pharyngeal wall. On digital examination, it was felt to be hard and circumscribed. It was as large, and extended about as far forward, as half a moderate-sized orange.

On externally examining the back of the head, it was at once seen that there was an

angular curvature forwards of the cervical portion of the spine, the vertebræ implicated being the second, third, fourth, and fifth. The spine of the sixth could be distinctly felt. The patient explained that he had always had this curvature, but had suffered no inconvenience until after an attack of Indian fever some years previously, since which it had seemed to increase. Immediate temporary relief was given on elevation of the head, by placing one hand under the chin and the other under the occiput. Consultation was held with Mr. William Adams, who advised a support which should diminish the pressure; this instrument was accordingly adjusted, and exercised a good result. The explanation of the symptoms in this case is, without doubt, decrease of intervertebral substance, and possible absorption of the compressed vertebræ, caused partly by debility after the Indian fever and partly by an excess of the natural tendency of the head to sink with advancing years. It is interesting to note further that the general health of this patient was exceedingly good, and that he was constantly and actively occupied, from philanthropic motives, in life-boat work on the southern coast.

New formations in the lower pharynx are rare, though fibromata, chondromata, and osseous tumours are all occasionally met with, and polypi are sometimes seen to descend from the naso-pharynx. Cohen reports that he has met with one case of ordinary papilloma growing from the mucous membrane in the posterior wall of the pharynx. I have treated many cases of small benign tumours of the soft palate, principally fibrous and sebaceous. Malignant growths are infrequent in this region. When occurring, they are generally of the encephaloid or lympho-sarcomatous variety. Syphilitic outgrowths from the posterior wall, or from the pharyngeal boundary of the larynx, are by no means uncommon.

The SYMPTOMS are those affecting **respiration** and **articulation**, but especially **deglutition.**

TREATMENT is mainly of an operative character. Where the tumours cannot be removed, artificial feeding by a long œsophageal tube may be necessary.

Foreign Bodies, such as too large pieces of food, fragments of bone from fish and game, artificial teeth, coins, etc., may lodge in the pharynx and give rise to great distress, and if not to be otherwise dislodged require introduction of long forceps or the instrument described at page 142 (Fig. CI.). Such accidents and their treatment do not require further consideration in these pages, since they come within the scope of treatises on general surgery.

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CHAPTER X.

DISEASES OF THE UVULA.

When inflammation or ulceration attacks the upper part of the pharynx and fauces, the uvula is almost always involved. It commonly becomes relaxed as a sequel of one or more previous attacks of sore throat, or such a condition may be, and often is, the first symptom of discomfort in this situation, and appears as the result of a low state of the general system, and without any history of acute angina. In such a case the relaxed uvula acts as the excitant, or at any rate as an aggravator, of a long train of most inconvenient, not to say serious, symptoms, and serves to make the throat peculiarly liable to catarrhal attacks.

That this is so may be proved by the fact that all efforts to relieve the chronic pharyngitis will often prove unavailing so long as the elongated uvula is allowed to remain intact; while, on the other hand, the simple removal of the relaxed tissue will as frequently prove efficacious without the employment of any other remedial measure. No further justification is therefore necessary for considering diseases of the uvula under a separate heading.

ACUTE INFLAMMATION OF THE UVULA—ŒDEMA OF THE UVULA (Fig. 28, Plate IV., and Fig. 36, Plate V.).

This is rarely seen except as associated with general pharyngitis; but now and again cases come under observation in which the uvula suddenly becomes red, swollen, and infiltrated, with comparatively little hyperæmia of the neighbouring parts.

This acute inflammation of the uvula partakes of the nature of tonsillitis, and occurs in people of an arthritic diathesis; the bowels are constipated, and the digestive system deranged. Œdema of the uvula is also not uncommonly seen in tertiary syphilis, in phthisis, and in cases of general hydræmia. Hæmorrhagic extravasation is also occasionally witnessed (Figs. 115 and 116, Plate XIV.). It is generally of traumatic origin.

The SYMPTOMS complained of are those of obstruction to the respiration, a sense of discomfort in taking food, and a frequent desire to swallow saliva, with but little acute pain.

Cough, when present, is of an irritating, tickling character, and is induced in those cases in which the uvula touches the epiglottis. It is, however, often absent in acute œdema when the enlargement is more that of bulk than of length.

TREATMENT.—Removal of the uvula is not advisable during acute inflammation, and it is preferable to make a few punctures and scarifications, followed by the use of astringent remedies. In syphilitic œdema the uvula should on no account be ablated.

SUBACUTE AND CHRONIC INFLAMMATION OF THE UVULA (Fig. 13, PLATE II.).

This is seldom seen unassociated with a certain amount of chronic pharyngitis, which is more often limited to the pillars of the fauces, without any extension to the velum. Chronic inflammation leads to the next affection :

ELONGATED UVULA—CHRONIC RELAXED THROAT (Figs. 13 and 14, PLATE II. ; Figs. 29 and 32, PLATE IV.).

This condition is met with in all classes of patients suffering from chronic angina, but especially in those who have been obliged to use the voice during catarrhal attacks—just, in fact, in those who have been described as most subject to chronic pharyngitis (p. 177). Very few people suffering from that disease have not a relaxed uvula ; but this last-named condition often gives rise to symptoms which demand treatment quite irrespective of the rest of the pharynx.

SYMPTOMS : A. FUNCTIONAL.—These vary greatly in different cases, and often require the nicest judgment for their discrimination.

Thus, while one patient with an evidently very pendulous uvula will not complain of any inconvenience, another with apparently but slight local cause will exhibit well-marked symptoms. The usual sensation is that of a desire to frequently clear the throat of a source of irritation ; this desire being only experienced at particular periods—as, for instance, on rising in the morning, on coming into a warm out of a cold atmosphere, and also when the general system is fatigued or disturbed. In more severe cases there will, under similar circumstances, be hacking, irritable

cough, with expectoration of small muco-gelatinous pellets, paroxysmal and spasmodic attacks, retching, and vomiting. I have seen several cases in which the last-named symptom occurred on the patient taking the ordinary morning cold bath, and in one instance the breakfast had been daily rejected for many weeks. In another case, gargling after cleansing of the teeth was always followed by violent spasm, with bloody expectoration, clearly traced to come from the pharynx.

When the uvula is very relaxed, the greatest discomfort is felt as the patient lies down at night; many cases occur of spasm of the glottis, so severe as to awake patients from sleep, and due to reflex irritation from this cause.

It is but natural that symptoms such as those described combine to bring the patient to a state of great nervous prostration; the want of sleep, the cough, and the retching will produce great weakness and even emaciation, and the patient will appear to be suffering from phthisis or grave organic disease; especially will this be suspected in those occasional cases in which there is an account given of fixed pain at some point in the chest, which, on examination, is found to be only another effect of reflex irritation.

I was consulted some seventeen years since by a medical practitioner who complained of constant pain in the left sub-scapular region, with irritable cough, loss of flesh, and impairment of general health; on the recommendation of two physicians, eminent in chest diseases, he sold his practice, but he entirely recovered his health after the removal of his uvula, and is still well and in active professional work.

Again, Mr. Low, of Burton-on-Trent, about two years ago brought me a gentleman of middle age, to whom a most alarming opinion had been given; and letters were laid before me detailing the presence of tubercle bacillus in his sputa, and forming a most gloomy prognosis. Mr. Low had all along attributed his symptoms to reflex irritation of an elongated uvula and its consequences. In this opinion I concurred, and after simple surgical treatment the patient made a complete recovery.

Gastric derangements will be aggravated by the presence of an elongated uvula, while, on the other hand, the symptoms caused by the relaxed palate will be increased by anything likely to induce or increase the disorder of digestion.

The ill effects of a relaxed uvula on the voice, especially if exercised in singing, are very marked. Fatigue and pain after functional use, loss of strength, purity, and brilliancy in quality, of steadiness (tremolo), and even of range, are the precursors of hoarseness and entire destruction of the singing voice. To the occurrence of such serious conditions as a direct result of relaxed uvula, both [1]Mandl and [2]Labus have testified. The latter very properly points out that disorder of phonation from this cause is due not so much to elongation of the uvula as to the difficulty

which, on account of its relaxed condition, the subject experiences in making the various movements of the soft palate which are necessary for the formation of different sounds; in other words, to paresis of the elevators and tensors.

B. PHYSICAL.—These are not easily mistaken, if the surgeon will bear in mind the following suggestions when he makes an examination of a relaxed throat:

1. Direct the patient to open the mouth without taking a breath, and the relaxed uvula, which, if in a normal condition, should on inspiration be retracted, will be seen to be lying on the tongue.

2. Should the palate not drop by the patient thus holding the breath, direct him to breathe through the nostrils, which will have the result of relaxing the palate, and the length of the uvula can be estimated.

3. Let the patient then breathe in deeply through the mouth or strike a high note, and it will be seen that the uvula is not entirely drawn up, owing to paresis of the tensor palati, or that the uvula goes up in wrinkles, partly from the same cause, and partly from the excess of relaxed tissue.

4. Remember that the amount of relaxation depends on the relation which the length of the uvula bears to the arch of the palate.

5. In those cases in which, observing all these precautions, the uvula does not appear to be relaxed, and yet there is no other reasonable cause for the symptoms, observe carefully the edges of the curtain of the soft palate, and they will be seen to be thinned, white, and quite translucent, and to almost flap about with respiratory action (Fig. 14, PLATE II.).

This last appearance will be often present in ordinary cases of otherwise recognisable relaxation of the uvula, so that it is quite possible to mark the boundary of membranous over-growth (Fig. 29, PLATE IV.). There is often hypertrophy of the lymphoid glands or follicles in the tissue of the uvula, giving the appearance of little tubercles, or fatty deposits or cysts. Their presence is of no real importance, except where pain is experienced. These little bodies may then be real tubercular deposits, and the commencement of a phthisical ulceration. Under certain circumstances they may indicate an early stage of lupus.

The larynx is generally slightly congested; this is due to the constant irritation of the cough. Mucus may often be seen lying in the inter-arytenoid fold. The veins at the base of the tongue are often concurrently relaxed, engorged and varicose, and the lingual tonsil hypertrophied.

Treatment.—The cause having been ascertained, it must be removed, at the same time that steps are taken to brace up the relaxed mucous membrane. Astringent lozenges and applications may be employed (Form. 12, 16, and 17 ; 62 and 65). These failing, there can be no reason why the simple operation of ablation of the relaxed portion should not be performed ; on general grounds, however, astringents should always be first used, since it is advisable to see how much of the relaxation is temporary and how much permanent. In mild cases, particularly when associated with dyspepsia, attention to the general health will often obviate altogether necessity for abscission.

In operating, the uvula should always be well drawn out with the long forceps and removed just above the point of junction of the mucous membrane with the body of the uvula (Fig. CXIII.). Instruments on the guillotine principle, called uvulatomes, are not

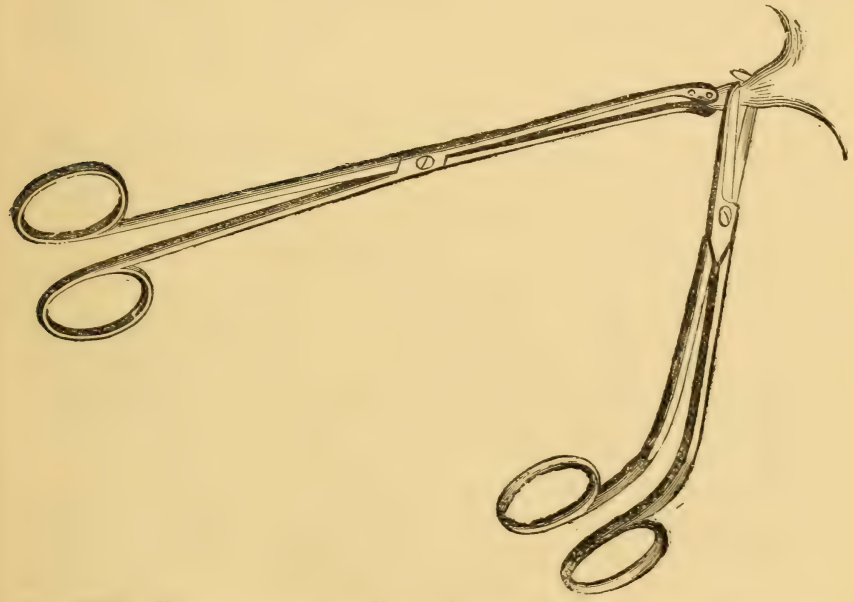

Fig. CXIII.—Uvula Forceps and Uvula Scissors, in Position for Operating.

suitable for the purpose of ablation of the uvula. The tendency to retraction of the velum when touched renders it very uncertain how much will be removed by such means. The parts are always bruised and crushed, but as there is no point of resistance to the instrument, the tissue is often only partially separated. An American physician informed me that ' he was bound to say that

he had never used an uvulatome without being obliged to finish the operation with scissors;' and such, it is believed, will be the general experience of all who employ this instrument. Nor is it advisable to make, for many days previously to removal, lines around the uvula with caustic pastes. No real death of the part takes place, but there is a considerable increase of inflammation around, so that when division is made, both the operation and the healing process are more painful and recovery more tedious. There is also a greater risk of secondary hæmorrhage. In cases where the uvula is very thin, and also where the patient has an objection 'to the knife' or to loss of blood, I am now in the habit of removing the elongated portion by means of the galvano-cautery used at a good bright heat, the tissue being first drawn out by the forceps, as has been advised, prior to division by scissors. In all circumstances I previously apply cocaine, in a 5 or 10 per cent. solution, as the pain of this quite minor procedure is really great in some cases, and is always apprehended by the patient. Where there is varix of the vessels at the base of the tongue I destroy them with the cautery point at the same time as, or rather prior to, removal of the uvula.

While it is better to take off too much than too little, cases have certainly occurred in which too complete removal of the uvula has been followed by long persistent pain and some difficulty in swallowing. Inasmuch as there already exists an unreasonable amount of prejudice against the surgical measures here advocated, it is a pity that anything should be done to bring disrepute upon so valuable an operation, of which it has been truly written [3] that 'while hardly any slight affection of the throat produces such serious symptoms as elongation of the uvula, it is equally true that there is no slight operation that gives such complete and permanent relief as removal of the elongated extremity.'

Regarding treatment by operation, Mandl has also well said that 'It is unfortunate that this operation should encounter very ill-founded opposition on the part of artists, since there can be no doubt of its happy effect on the voice due to the removal of a permanent cause of irritation in those cases in which it is indicated.'

If the patient be directed, after the operation, to sit perfectly still without washing the mouth, hæmorrhage but seldom happens —never when the cautery is employed, unless the platinum be of more than red heat; should bleeding occur, the sipping of a few drachms of a saturated solution of tannin (Form. 4) will speedily check it. Should it recur, application of the fluid known as

styptic colloid—a combination of collodion, alcohol, and tannin —will have the desired effect of forming a more firm coagulum The pain of the operation itself is generally but slight, though sometimes intense; the amount of after-pain is likewise very variable; more or less discomfort in swallowing is experienced for from twenty-four hours to a week, and all food should therefore be soft and tepid. With sensitive patients I recommend application of a five per cent. solution of cocaine to the cut surface prior to taking food. Where there is pain in the ears, drops of laudanum, atropine, or cocaine applied on wool along the external auditory meatus are serviceable. Care must be taken to avoid catching cold; the patient should stay within doors for a day or two, and the voice should be completely rested. One other caution is necessary with reference to the after-treatment of these affections; viz., that, as in all other cases of reflex irritation, some time may elapse before the symptoms disappear after the cause has been removed. Remembrance of this fact will often prevent disappointment and discouragement.

MALFORMATIONS AND NEW GROWTHS.

The uvula may be asymmetrically truncated, bifurcated, or even absent, as the result of an arrested development. The accompanying drawing (Fig. CXIV.) represents an extreme case in which a congenitally double uvula is the subject of considerable relaxation, giving rise to the ordinary symptoms of discomfort. It occurred in a young man, æt. 22, the patient of my colleague, Dr. Orwin. The hard palate was very contracted and highly arched, but no difficulty had been experienced in either articulation or deglutition. Removal was followed by relief of all disagreeable symptoms, and with improvement to both speech and deglutition.

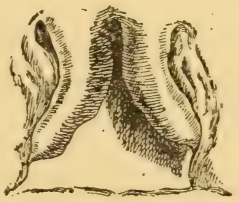

FIG. CXIV. — CONGENITALLY DOUBLE UVULA, WITH RELAXATION.

Warty growths, not necessarily dependent on any syphilitic history, though generally found in patients having that dyscrasia, are not unfrequently found growing from some portion of the surface of the uvula. Benign neo-plasms do not as a rule give rise to much inconvenience; but in several instances which have come under my notice the growths have been attached by a very long pedicle, and have produced violent irritation of the larynx and spasmodic cough.

In one such case which (Fig. 30, PLATE IV.) I reported to the Medical Society of London, so far down did the growth hang, that it was not seen until a laryngeal mirror, introduced to examine the glottis, pushed it up into view. In this case, removal was followed by immediate relief of distressing and even urgent respiratory symptoms, with constant spasmodic cough ; and such is the treatment to be generally recommended.

Angeiomatous (vascular) growths have also been reported as arising from this situation, and cases have come under my notice, both in my own practice and that of my colleagues. They have been successfully treated by galvano-cautery.

I have never seen **malignant** disease of the uvula arising primarily in that situation, but twice I have noticed it as an extension from epithelioma of the tonsil.

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CHAPTER XI.

DISEASES OF THE FAUCIAL TONSILS.

THE regional and microscopic anatomy of the faucial tonsil has already been described (p. 28), but for the readier appreciation of the changes it may undergo in disease, it will be well to consider its structure in somewhat more minute detail.

Histologically, the tonsil is a large lymphatic gland. Like other lymphatic masses situated throughout the alimentary canal, that portion of the gland which looks towards the lumen of the tube is separated only by a few layers of stratified epithelium, and by a thin covering of submucous tissue, from the faucial passage. This free inner mucous surface of the gland is not smooth, but presents, as previously mentioned, from twelve to eighteen orifices. These orifices lead to recesses, crypts, or lacunæ in the substance of the tonsil. The crypts are not true secreting glands, but mere involutions of the mucous membrane, in every way identical with similar structures situated at the posterior surface of the tongue, and accordingly rather of the nature of ducts, or 'reservoirs,' for leucocytes. Ranged round the walls of the crypts are a large number of closely aggregated spherical and oval lymph-follicles—the leucocyte manufacturing centres. It is of these latter, together with the less dense lymphoid tissue by which they are surrounded, that the mass of the tonsil is composed. The lymphoid follicles are made up of a fine connective-tissue reticulum, in the meshes of which are the dividing leucocytes; the reticulum becomes much more dense at the circumferential portion of the follicle, but the capsule thus formed is sufficiently permeable to allow of the emigration of leucocytes from the interior. Each follicle is surrounded by a lymph plexus, or sinus, which, however, is absent on that side of the follicle which is opposed to the adjacent mucous lining of the crypt. The deep surface of the gland is embedded in the tissues of the fauces, and is immediately in contact with connective-tissue, this latter forming a peritonsillar membrane or

capsule. All these various parts are well illustrated in Fig. CXV., the drawing for which was kindly made for me by William Hill, when Pathologist to the Throat and Ear Hospital. The lymph-follicles of the tonsil differ in no respect histologically from those found lower down in the alimentary canal, and there is probability in the suggestion of [1]Hingston Fox that they may have a somewhat analogous function; he, however, thinks that the purpose of the spongy tonsils is to absorb, through the crypts, the excess of saliva which is constantly being secreted. The investigations of Hill, previously alluded to, leave little doubt but that the various tonsils are leucocyte-secreting organs, and one is almost irresistibly led to accept the conclusion that the leucocytes, which pass by diapedesis from the lymph follicles into the crypts, act as phagocytes, or 'scavengers,' in the mouth and pharynx.

The tonsil is liable to undergo the same pathological changes as other lymphoid structures. The adenoid tissue is rarely affected

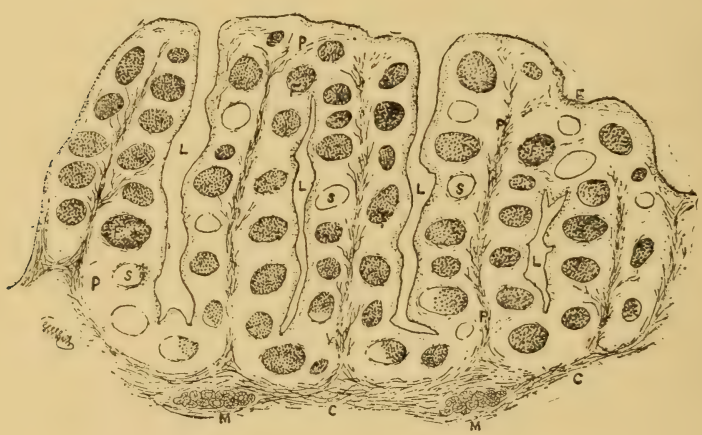

FIG. CXV.—SECTION OF A (SLIGHTLY) HYPERTROPHIED TONSIL.

E. Stratified epithelium covering the surface and lining.
L. Lacunæ or crypts.
P. Parenchyma, the adenoid tissue of which is not shown.
F. Lymph-follicles, S. Lymph-spaces mechanically voided of their contents, in section.
M. Mucous glands.
C. Capsule or peritonsillar membrane, trabeculæ of which pass into parenchyma.

without involving the mucous membrane also. Acute inflammation (suppurative and non-suppurative), subacute and chronic inflammation, general hypertrophy, ulceration (simple and specific), induration and malignant degeneration, are conditions interesting in their clinical rather than histological aspects.

For the general consideration of the etiology of tonsillar inflam-

mation, the reader is referred back to the chapter on the general etiology and pathology of throat diseases. The idea is now gradually gaining ground that tonsillitis is nearly always in association with abnormal states of the buccal secretions, as first insisted on by Hingston Fox—the most common form of contamination being that which comes under the head of *septic*. Probably nine out of every ten cases of tonsillitis are associated with the growth of micro-organisms in the mouth and throat—the buccal secretions are thus extrinsically contaminated. Under this heading we must include ordinary insanitary and hospital sore-throat, together with the tonsillitis (whether membranous or not) of scarlet fever, diphtheria, small-pox, measles, and typhoid. It was long believed that the tonsillitis associated with the gouty and rheumatic diatheses, as well as that due to exhaustion and mental fatigue, and that occasioned by an ordinary catarrh, were not catching, were of a non-epidemic form, and were not, therefore, connected with the presence of a micro-organism. Evidence, however, has been brought forward to show that acute rheumatism, and especially rheumatic tonsillitis, is a germ disease; and it is suggested that the secretions of the mouth and throat form a fertile culture-ground for micro-organisms when the buccal secretions are intrinsically contaminated by the salivary and oral glands acting as extraordinary channels of excretion in catarrhal and diathetic states of the system. In the recent discussion on tonsillitis at the Leeds meeting of the British Medical Association, Hingston Fox and A. Garrod insisted strongly on the association with micro-organisms of most forms of acute and subacute tonsillitis, including the rheumatic variety. These facts will readily explain the impossibility that all practitioners must have often experienced of differentiating a 'septic' from a 'rheumatic' tonsillitis, and, indeed, they go far to support the opinions of those who hold that acute rheumatism is a microbic disease, though not necessarily associated with a single specific organism.

ACUTE TONSILLITIS, AMYGDALITIS, ANGINA TONSILLARIS, ACUTE INFLAMMATION OF THE TONSILS, QUINSY (Fig. 31, PLATE IV., and Fig. 36, PLATE V.).

The mucous covering of the tonsils may partake of any of the general inflammations attacking the pharynx and fauces, but, as usually understood, the term 'quinsy' implies acute inflammation limited to, or at least originating in, the parenchyma of the glands themselves. Several distinctions have been made in this affec-

tion, but for practical purposes they are mainly differences in amount and in degree; thus only the mucous surface and the orifices of the crypts or lacunæ may be inflamed (*superficial tonsillar angina*), or only a few crypts may be attacked by inflammation and their function arrested without involving the adenoid tissue (*lacunar tonsillitis*, the so-called *follicular catarrh of the tonsils*), or the whole gland-structure of the tonsils may be involved (*parenchymatous tonsillitis*). This stage, when proceeding to suppuration, is in turn termed *tonsillar abscess*, and by some authors the term 'quinsy' is, without philological reason, reserved for this suppurative stage. While on this question of nomenclature, I may express a hope that, before long, the erroneous term of *follicular tonsillitis*, still more ignorantly termed 'ulcerated sore throat,' may be abolished, for these names have been applied to a condition in which the lymphoid follicles are by no means necessarily involved, and in which there is no ulceration. The term *lacunar* was adopted by me some years ago as accurately representing the anatomical situation of the morbid condition. It has since been pointed out to me that it had been previously proposed by Wagner. So-called *peritonsillitis*, in which the inflammation is of the connective-tissue around the gland, often occurs as a result of a low state of health, which may be the exciting cause. In my experience this variety is generally associated with septic conditions of drinking-water or residential surroundings. There is, however, frequently superadded the special diathesis, to be presently considered, as almost invariably present in the subjects of both the lacunar and parenchymatous forms.

The inflammation may subside without proceeding to suppuration; it may be superficial and limited, or deep and general. In giving a description of this disease, therefore, it need only be hinted that all the symptoms and signs may not be present in every case in actual practice, or, if present, many of them may be considerably modified.

Etiology.—Among the most common predisposing causes assigned by various writers has been a strumous constitution, rendering the patient liable to inflammatory attacks similar to those so frequently seen in the lymphatic glands. This view has, however, always required the qualifying admission that in tonsillitis exposure to cold is an exciting cause, whereas catarrh plays no important part in the production of ordinary strumous glandular affections.

From most careful examinations, extending over a number of years, I have long been of the opinion that the darthous or

arthritic diathesis invariably exists in those patients subject to recurrent attacks of acute tonsillitis. There need not necessarily be, though there very often is, corroborative evidence, either in the family or personal history of the patient; but it is certain that attacks of quinsy are most prevalent at those periods of the year and under those atmospheric conditions which are most favourable to rheumatic exacerbations, viz., in early spring and the later months of autumn, when cold damp weather with south-east winds is prevalent.

Indeed, so close is the relationship between tonsillitis and rheumatism, that in order to complete the picture of the etiology of the former affection one cannot do better than quote almost verbatim the concise account of the predisposing and exciting causes of acute rheumatism given by [2]F. T. Roberts, merely changing the name of the disease:

'**Predisposing Causes.**—Tonsillitis is distinctly an hereditary disease, and it tends to run in families. It chiefly attacks persons from fifteen to thirty-five years old, being especially frequent from sixteen to twenty, but no age is exempt.' It is rare to see true lacunar tonsillitis, either acute or chronic, in young children, though I have seen a typical case of quinsy in a young girl only ten years of age (Fig. 31, PLATE IV.); and [3]Reid has recorded a case of suppurative tonsillitis in an infant aged seven months. It is most common between the ages of fifteen to thirty; after thirty-five it is rarely seen, though cases have been reported up to sixty, and one, by [4]Whistler, at a still more advanced period of life, namely, sixty-five. I have recently attended a young lady, whose father informs me that he had an attack of true quinsy when seventy-one. He is now in his eighty-first year. 'Previous attacks decidedly increase the predisposition to the disease. More cases are met with among males, and in the lower classes, on account of their greater exposure to the exciting causes. Climate and season have a considerable influence, the affection occurring mainly in temperate but very moist climates, and where there are sudden changes of temperature. It is far less common in tropical and very cold countries. The same conditions influence the prevalence of the complaint at different seasons. A state of ill-health from any cause is said to predispose to tonsillitis, and also mental depression or anxiety; but many individuals are attacked when in apparently perfect health.'

'**Exciting Causes.**—The ordinary exciting cause is a sudden chill, induced by exposure to cold and wet; sitting in a draught when heated or perspiring; neglecting to change wet clothes, or in

other ways. In not a few instances no definite cause can be fixed upon; and it is quite conceivable that processes may be gradually carried on in the system which tend to generate an amount of poison sufficient to set up the complaint. Errors in diet, suppression of menses, and various other disturbances, have been ranked as causes.' It is not at all uncommon to see amenorrhœa lead in the same patient at one time to rheumatism, and at another to tonsillitis. 'Scarlatina seems to lead to tonsillitis sometimes, probably by interfering with the excretory function of the skin (and gland).'

When many years ago I first insisted on the rheumatic diathesis as the principal etiological factor of quinsy, it was received in some quarters with ridicule, and by many as an exaggeration, but since then the same idea has been enunciated as quite an original view by more than one writer. [5]Haig Brown, apparently ignorant of what I had written, has truly said that 'One may do more than merely suggest a comparison, and say that the tonsillar inflammation is sometimes truly rheumatic; or, in other words, that in many instances the cause which *predisposes* to the development of tonsillitis is the rheumatic habit, while the cause which *excites* the inflammation is cold and damp, just as these are the usual determining factors in articular rheumatism.' He gives statistical evidence of the most convincing character as to the association of rheumatism and tonsillitis, mentioning especially the occasional manifestations of a cardiac complication during an attack of quinsy. Other etiological factors of tonsillitis doubtless exist, and of these the principal is that of a septic character. To this subject the author just quoted has devoted much attention. The chief septic causes of tonsillitis are the drinking of impure water or milk diluted with impure water, and the exhalations of sewage-gas; and these causes will act more powerfully in those patients who are the subjects of the rheumatic disposition. Caution must be exercised in accepting such forms of tonsillitis as purely innocent, and especially if several members of a household are attacked.

It remains only to add that acute inflammation of the tonsils may indifferently attack a gland, the subject of chronic enlargement, or one which is of normal size or even atrophied. All tonsillar inflammations may be unilateral or bilateral, and not unfrequently, disease having been arrested, or having subsided on the one side, is developed in the opposite. I entirely concur in the opinion of [6]Hingston Fox, that where both glands are

attacked simultaneously, the inflammation is almost invariably of a septic nature, and this circumstance constitutes a valuable diagnostic sign. In all cases the inflammation is liable to extend to the lymphatic tissue of the pillars of the fauces, and to the soft palate.

SYMPTOMS: A. FUNCTIONAL.—**Voice.**—The phonetic quality of the voice is not affected, except in so far as general prostration may diminish its power.

Articulation and enunciation are greatly impeded, and are quite characteristic in the obvious pain accompanying the acts and in the complete unintelligibility of the speech; articulation is affected by the inflammatory swelling of the gland and of the pillars of the fauces; difficulty of enunciation depends largely on impaired mobility of the jaw.

Respiration.—The free passage of air to the lungs is impeded, and **nasal breathing** is almost entirely obstructed, the patient snoring loudly even when awake.

Cough.—None; but a frequent desire is felt to clear the mouth and back of the pharynx of the peculiar and abundant viscid mucous secretion.

Deglutition is greatly impeded by narrowing of the faucial orifice and muscular spasm, and is accompanied by pain of a lancinating character, extending to the temporo-maxillary articulation. It is this pain which prevents the patient opening the mouth, and also causes even the swallowing of saliva to be distressing. There is often complete inability to swallow any food, even of the softest consistence, blandest character, and mildest temperature; and attempts at drinking frequently result in ejection of the fluid through the nostrils, some of it also oozing with saliva and mucus from the angles of the mouth.

Hearing is often temporarily impaired, with not infrequent pain, due to extension of the inflammation to the middle ear, as well as to irritation of the chorda tympani. The gravity of the aural inflammation varies, and is seldom severe; but cases of exudation, serous and purulent, into the tympanic cavity, are by no means unknown. In many instances severe tinnitus—usually of the pulsating variety—is complained of.

The senses of Smell and Taste are both greatly affected; the latter being much impaired by the constant presence of foul secretion in the mouth.

Pain in connection with functional exercise has been already alluded to; but it is a constant, ever-present symptom of the disease, and the one element which appears more than another to produce the very characteristic prostration. At the commence-

ment of an attack there is simply a feeling of dryness and heat; but as the affection advances the swelling of the parts and of the surrounding glands, the cramp of the muscles, with ineffectual attempts to perform functional acts, and to be rid of oppressive obstruction, all tend to produce a sense of well-nigh intolerable suffocation. Pain is complained of, not only in the throat and, as before mentioned, in the ears, but in the temporo-maxillary articulation, and in rotation of the head, which is often held quite stiff, as in retro-pharyngeal abscess. Headache is also a constant and wearying symptom. Painful sensations are always increased on awakening from sleep.

B. PHYSICAL.—The practised observer will, if the disease be at all advanced, have probably arrived at a correct diagnosis on hearing and seeing the patient's attempts to describe his symptoms; but any doubt will be at once removed when he endeavours to examine the throat, the difficulty of opening the mouth being almost pathognomonic. Should he succeed in gaining a view of the fauces, he will see, behind an overloaded foul tongue, a more or less uniformly red and swollen mucous membrane. The affected tonsil or tonsils (most frequently only one is attacked at first; or one is in a much more advanced stage of inflammation than the other) will be seen heightened in colour, and enlarged in size, causing great narrowing, or complete closure, of the faucial orifice. Sometimes the crypts will be observed to be blocked by arrested excretion, or covered by a foul, creamy exudation. The uvula, which may partake of the inflammation, and be œdematous, will more often, in non-septic cases, be seen relaxed, and will be lying adherent, as it were, to one or other tonsil. The pillars of the fauces are not always inflamed, but the anterior ones are more often involved than the posterior. The inflammation rarely extends to the pharynx, and still more seldom to the buccal cavity, or mouth. In patients predisposed to quinsy, and whose tonsils have been removed, subsequent recurrence may attack the fauces. It is, however, very rarely that the process in such a case goes the whole length of suppuration.

When visual inspection is impossible, it may be desirable to examine with the finger, so as to ascertain whether suppuration has taken place; but such a procedure should be adopted with hesitation, as it always occasions increase of the pain.

C. MISCELLANEOUS.—In these, as in the causes, there will be noticed a great analogy to rheumatism. The general system is greatly disturbed, the patient being really ill. Frequently the disease commences quite suddenly, but more often there is a

warning of a day or two. In hospital practice patients seldom apply until they have been ill three or four days, 'thinking the attack would pass off.'

At the commencement the ordinary febrile symptoms of inflammation are present, viz., heat of skin, nausea, thirst, etc., with nocturnal exacerbation; frequently there is the warning of a rigor; this stage is soon succeeded by profuse, cold, sour perspiration, with pallor of surface, anxious expression of countenance, and mental depression, greatly increased by want of sleep, and occasionally resulting in delirious wandering. The tongue is coated, the breath foul; appetite is lost, and thirst is constant. The temperature is greatly increased, averaging 103° F., but sometimes rising to 104° and 105°, the pulse being correspondingly accelerated.

Obstinate constipation invariably precedes and accompanies the disease; the urine is high-coloured, and loaded with excess of urea and urates, and deficient in chlorides; occasionally there is presence of albumen. Dr. Haig Brown has noted 'that the existence of albumen in the urine seems to be in direct ratio to the height of the temperature. When this is over 103° a trace of albumen is often present; but there are no casts, and the albumen always disappears when the temperature begins to fall. Its presence is of no more importance than is the transient albuminuria of pneumonia and erysipelas, though on first finding it one is apt to feel a little uncertainty as to whether the throat affection is not of a diphtheritic nature. Yet it is important to note the time of its appearance—if it do appear—and of its disappearance, and for these reasons: if albumen be found for the first time on the second or third day, the temperature being at 103° F., or more, and disappears on the fourth, we are almost surely dealing with a case of simple tonsillitis; if, however, we find albumen in the early days, with a comparatively low temperature (100° or 101°), and especially if the albumen persist for two or three weeks, the case is most likely one of diphtheria; while, if there have been no albumen early, and it be found for the first time after the end of two, three, or more weeks, it is most probable that the case has been one of latent scarlatina.'

It is always well to examine the heart, as occasionally a bruit is the only possible indication of the rheumatic character of the tonsillitis. In recent years I have often been amazed to detect heart-murmurs in simple subacute tonsillar inflammations.

Externally, except where there is suspicion of diphtheritic or scarlatinal origin, there is seldom sufficient glandular enlargement to account for the pains and stiffness in the lower jaw, but there is

sometimes, in severe cases, painful puffiness of the tissues of the face and neck. Very frequently there are associated rheumatic articular and muscular pains in the limbs, and in many cases in which the disease does not reach suppuration, resolution of the local trouble is followed by a smart attack of rheumatism, or rheumatic gout.

Differential Diagnosis.—The diseases that may be confounded with tonsillitis are diphtheria, phlegmonous pharyngitis, scarlatina—where the rash is ill-developed—syphilis, cancer, post-diphtheritic and labio-glosso-laryngeal paralysis.

From *diphtheria* it may be differentiated by variation in many of the subjective and general symptoms, into which it is needless here to enter. Especial points of distinction are the ease with which the fauces can be examined in diphtheria, and the fact that the secretion in tonsillitis is limited to the tonsils themselves, is non-adherent, and does not lay bare a bleeding or ulcerated surface when removed: whereas it is most rare, when diphtheria attacks the pharynx, not to see patches, which are firmly adherent, on the uvula and soft palate. Cases are now and again seen in which diphtheria follows on an attack of tonsillitis; in such an event the inflammation is exhibited, as is the diphtheria itself, on both tonsils equally. A bilateral tonsillar inflammation of the *lacunar* variety not unfrequently occurs to some members of a household, generally the elder relatives or immediate attendants, in which diphtheria has arisen. Such an attack may not go to the length of suppuration, but will have many modified points of resemblance to the more serious malady, and will exhibit several of its complications and sequelæ. These septic varieties of tonsillitis, which are often highly infectious, may arise independently of co-existent evidence of diphtheria epidemics; and they have been thought to be forms of sore throat intermediary between those of diphtheria and scarlatina, the exudation of the one and the exanthem of the other not being manifested, but the neurosal and renal complications being often exhibited. The diagnostic facts just quoted regarding presence of albumen in the urine, and the different signs of scarlatina, to be presently mentioned, are of value in deciding the innocent or septic character of the attack.

In the sore throat of *scarlatina* the local differences are not so well marked, but both tonsils are always attacked simultaneously. The hot, dry skin, high degree of pyrexia, flushed face, and characteristic enlargement of the papillæ of the tongue, even without the appearance of the rash, will assist in marking the distinction. It must not be forgotten that in some rare instances of tonsillitis there is a slight skin eruption. In such a case the

erythema may be due either to rheumatism or to septic influence. On the other hand, it must equally be remembered that scarlatina is not always followed by desquamation, and that the kidneys are not always affected. The most characteristic point of diagnosis is glandular enlargement at the angle of the jaw in scarlatina, and the absence of such a symptom in simple tonsillitis.

Phlegmonous Pharyngitis is often treated as tonsillitis, and the two diseases are indeed considered as one by Cohen, who uses the two terms synonymously. They may be differentiated by the history, by the marked asthenia, and locally by the fact that the peritonsillar tissue is affected rather than the gland itself in phlegmonous inflammation.

Measles and *German Measles* are often complicated with sore throat, bilateral in character, but very rarely accompanied by tonsillar inflammation.

Syphilis.—On first consideration, it would hardly appear that there was much likelihood of a mistake being made between this disease and acute inflammation of the tonsils; but the possibility of error would not be suggested, had not I witnessed examples of it, both in the early secondary and in the acute tertiary forms.

The tonsils are often inflamed as part of the process of secondary manifestations; but a careful comparison of the symptoms, as described in these pages, especially with reference to the particular characteristic of secondary syphilis—symmetry; and of the tertiary form—destructive ulceration, will enable the practitioner to avoid so serious a mistake.

Cancer.—In the distressing and rare affection of primary cancer of the tonsil there is infiltration and enlargement of one gland only and of the surrounding lymphatics, with fœtor of breath, foulness of tongue, and difficulty of swallowing, which might well lead to an error of diagnosis. Here, again, a correct opinion will most often be arrived at by care in noting the history and general symptoms. Especially will it be remarked that the graver disease proceeds with slow and gradual steps, and has probably existed for some weeks before advice has been sought.

In both *post-diphtheritic* and *labio-glosso-laryngeal paralysis* the difficulty in opening the mouth, the thickness of speech, similar to that noticed in quinsy, the dysphagia, ejection of fluids by the nostril, and excess of salivary and mucous secretion, might all, at first sight, lead to an erroneous diagnosis. Inquiry into the previous history, the duration of symptoms, and physical examinations will clear up doubts.

Duration and Prognosis.—An attack of tonsillitis seldom

lasts more than a week; but there is a great tendency to relapse, especially if the patient has been subjected to insanitary influences. One tonsil having been affected, and the attack having terminated by resolution, the opposite gland may, a few days later, become inflamed, and proceed the whole length of suppuration. Thus the illness may extend to two, or even three weeks. Gangrene never occurs in the form of tonsillitis here described. The prognosis as to recovery is almost invariably favourable, and convalescence is, as a rule, wonderfully rapid.

The patient must be warned that a first attack is but too often the forerunner of others, which may recur with almost periodical regularity.

Cases of death from quinsy have been reported, but in all probability they have been due to association with more serious disease, especially with exanthematous affections, in which the eruption has not been developed. Very rarely, as in young children, death might occur from inanition; but, as already pointed out, the disease is not frequent much before puberty. There is the possibility also of death from hæmorrhage on the bursting of an abscess. Extension of simple tonsillar inflammation, however acute, into the larynx is a rare complication.

TREATMENT: **General.**—First and all-important is a thorough clearance of the *primæ viæ*, with the continuance of moderate purgation throughout the whole course of the attack. Resolution is greatly favoured by the early and frequent administration of one-drop doses of aconite (Form. 86).

Guaiacum given in mixture, as first advised by Sir Thomas Watson, or in the form of lozenges (Form. 21), appears to act both locally and constitutionally, and its almost specific effect tends to strengthen the rheumatic analogy. On this same ground the renal secretion should be kept alkaline by the potash salts (Form. 95). In my earlier edition I stated that I had lately tried salicylic acid with fair results. Since that time I have had increased experience of the salicylic treatment, and generally adopt it as preferable to that by aconite—for one reason that it is of greater activity in preventing extension of the rheumatic process to either muscles or articulations (Form. 98).

Where there is any depressing influence, iron may be added to the saline mixtures (Form. 96); with the salts of salicylic acid I generally combine cinchona. On recovery, simple vegetable bitters with alkalies (Form. 97 and 100) are much more serviceable than the stronger, but less easily assimilated, tonics.

Local.—Contrary to recognised traditions, the use neither of

steam (except with Lee's instrument, page 105) nor of spray inhalations is recommended, as the fatigue they cause the patient far outweighs any benefit to be derived from them.

Ice, again, although occasionally grateful, much more often aggravates pain and cramp. By far the most effective and agreeable of all local measures is the frequent holding in the mouth, with mild attempts at gargling by the Von Troeltsch method (page 100), of warm water medicated with glycerine of carbolic acid (1 to 40 or 60), or salicylic acid (1 to 100). In cases of naso-pharyngeal stoppage and accumulation the syringing of the nostrils with a saline solution is often attended with marked relief (Form. 73, 74, 75, and 78). Lemonade made from the fresh fruit and with a little sugar, taken through straws, is very refreshing, and is often successful in 'cutting the phlegm.' Guaiacum lozenges are serviceable in the early stages in producing resolution, but are only wearisome and useless when symptoms of suppuration are manifested. Amongst recent remedies, the direct application of carbonate of soda in powder, lozenges, sprays, or mouth-washes in strong solution of the same, gives speedy relief, especially in the undoubtedly rheumatic varieties. Salicylate of soda in excess of alkali, as a mouth-wash, and menthol, as a spray, paint, or lozenges are equally serviceable in the rheumatic and septic varieties.

Externally, severe counter-irritation, leeching, and other depletive measures, are to be condemned. External application of a stimulating liniment of ammonia, of the compound mustard liniment, or of the iodine liniment (B.P.), are, if employed early, of possible service in assisting resolution of the local inflammation. Linseed poultices—the earlier ones containing a small proportion of mustard—wet compresses of linen or Iceland moss, if not of great utility, are of too established a reputation to be omitted from enumeration; many patients prefer a simple warm silk wrapper. For some years past I have been in the habit of commencing the treatment of every case of tonsillar inflammation without reference to its variety or causation by the application of continuous cold, as explained at page 116. The results are so satisfactory in procuring prompt and appreciable relief of the symptoms, and of really arresting or abbreviating the attack, that this measure may be recommended with the fullest confidence as one never to be neglected.

The question of the time for surgical interference is one on which considerable difference of opinion exists; the following is the practice which I pursue and recommend:

1. Never to inflict unnecessary pain by useless scarifications on the surface of a tonsil undergoing general inflammation.

2. Never to make deep incisions unless there is almost certainty of advanced suppuration. The instrument for making an incision should be a curved pointed bistoury with not more than one inch of cutting edge, and the cut should be made from without inwards, so as to avoid the not impossible risk of injuring the artery.

3. To recommend removal, on subsidence of the attack, of tonsils chronically enlarged and liable to quinsy.

4. To remove the tonsils as soon as they become sufficiently enlarged in those cases of recurrent quinsy in which there is not chronic enlargement, but in which the tonsil, though diseased, is too small for excision, except on occurrence of the acute inflammation. By this means the present attack is at once cut short and the chance of further recurrence avoided.

Prophylactic.—On occurrence of tonsillitis in the case of children, the patient should at once be isolated until the nature of the case is clearly ascertained; and with all, confinement to bed is desirable, but steam-kettles and thick curtains and screens are unnecessary and depressing. In view of the fear of general rheumatism supervening on the throat attack, great caution is to be exercised against taking a chill during convalescence. The hints already given of the liability to recurrence, and of the predisposing causes, will sufficiently indicate the necessity of cautioning the patient on recovery, on all matters of diet, climate, and sanitary surroundings. Sea-air and Continental baths certainly help to diminish the tendency to development of the diathesis.

Seeing that constipation invariably precedes an attack of quinsy, it behoves the patient to pay particular attention to the regular daily action of the bowels. There is nothing better for this purpose than the natural saline aperient waters—Karlsbad, Friedrichshalle, Hunyadi Jãnos, Pullna, etc.

CHRONIC INFLAMMATION OF THE TONSILS (Fig. 33, PLATE IV.). —ENLARGED TONSILS (Fig. 32, PLATE IV.).

The first-named condition may result as the remains of an acute inflammation, or it may be due to a chronic disease of the lacunæ of the gland, tending to inflammation, dilatation, and obstruction of the crypts, with hypertrophy of the parenchyma. So-called chronic follicular disease of the gland—preferably *chronic lacunar tonsillitis*—does not, as has been already pointed out, necessarily imply glandular enlargement, and this occasional absence of hypertrophy is the reason why such cases are so obstinate of cure. More usually, enlarged tonsils are caused by an indolent catarrhal inflammation, occurring principally in

scrofulous children, leading to enlargement and more or less induration; or it may be due to a true hypertrophy, with but very little, if any, inflammatory deposit, much as the lymphatic glands may become enlarged without going the length of inflammation and disintegration. As a rule, disposition to all tonsillar inflammation decreases with advance of years; but I have met with several notable exceptions.

One that impressed me was that of a maiden lady of middle age, seen nearly three years ago in consultation with Dr. Davy, of Walmer. The tonsils were not enlarged, but both, particularly the left, were inflamed, with several points of cryptic obstruction, and some pain in swallowing and in other functional acts was experienced. An alarming diagnosis of cancer, with a prognosis of only three or, at most, six months of life, had been made: but I had little hesitation in giving a much more favourable, though equally positive, opinion. On learning it, Dr. Davy was told by the other practitioner in question that he was content 'for time to be the arbiter between us.' I, however, urged yet another consultation, and Dr. George Johnson was selected by the patient. His opinion was promptly enunciated as confirmatory of mine. Treatment on the general and local principles to be presently detailed was adopted. The patient very soon recovered, and is still living in excellent health.

SYMPTOMS: A. FUNCTIONAL.—The subjective signs of chronically enlarged and inflamed tonsils need hardly be elaborately described, since the physical evidences are so easy of detection.

Voice will be husky, toneless, and easily fatigued; when there is hypertrophy, it will be thick, guttural, or nasal, and will generally be high-pitched.

Articulation will also be interfered with, the patient speaking as with a full mouth, and having great difficulty in pronouncing palatal consonants.

Respiration can never be carried on healthily where the tonsils are diseased, since all inspired air passes over an unhealthy surface, the narrowed naso-pharynx leading to mouth-breathing. There is always nasal stenosis, a condition aggravated by the almost invariable presence in children and adolescents, and even in adults, of post-nasal adenoid growths.

Where enlargement is considerable, the lungs are never fully aërated, the chest-walls become narrowed and the breast-bone is prominent; the patient is torpid and lethargic, and is very liable to attacks of pneumonic congestion. It is not often that respiration is impaired to the extent of really alarming symptoms of suffocation, but

one such case has been recorded by [8] Wesley Mills as having occurred in a child three years of age. The attacks generally occurred while eating, but at night also attacks of coughing and suffocating spasms were so frequent as to cause alarm lest death should result.

Nasal respiration is generally greatly impeded from the obstruction, as well as from concurrent hypertrophic rhinitis and ade-

noids, which cause the patient to snore loudly in sleep, to awake with a dry throat and mouth, and to breathe audibly during the day, with the mouth wide open, this last in association with *aprosexia* giving a characteristically stupid expression to the face. Attention has been drawn by some writers to the flattening of the nasal bones, due to insufficient dilatation of the naso-pharyngeal space, and the appearance is considered by them distinctive: this condition is, however, often observed in other diseases which cause obstruction in the nasal passages. The alæ of the nose are often pinched and dimpled from disuse.

Cough is not a common symptom, but I have seen a few instances of severe spasmodic cough sometimes simulating pertussis due to reflex irritation from enlarged tonsils.

One very remarkable case came under my notice in December, 1876. It was that of a little boy, aged ten, who had suffered from constant 'hemming' of the throat for about twelve months, and from persistent dry barking cough without expectoration, very similar to that known as hysterical, for the last six weeks. So persistent was this cough that it would recur in the intervals of eating at meal-times, and the moment he awoke at night. The little patient had been under the care of two able family practitioners, and had been treated for stomach-cough, tooth-cough, thread-worms, and every other conceivable cause for the irritation, all without the slightest benefit; the boy was becoming exhausted, was losing appetite and flesh from want of sleep and the ever-present distressing cough. On looking into his mouth, the tonsils were seen to be very much hypertrophied; and failing on examination to find any other abnormal condition, they were, with the consent of the father, then and there removed. From that moment the child lost his cough, and it has not since returned.

Two almost exactly similar cases came under my notice in the year 1886, each little patient being the child of a medical confrère. In both the success of treatment by removal of the cause was as complete as in the case narrated. Recent experience leads me, even when the tonsils are not much enlarged, to suspect adenoid growths in all cases of reflex spasmodic cough.

Deglutition is seldom painful, but generally uncomfortable, especially on the slightest recurrence of inflammation. There is unusual sensitiveness to food at high temperature and of piquant character. Another characteristic of enlarged tonsils is that there is a desire to take fluid very frequently during eating, so as to assist the passage of solid food; and there is often a difficulty, especially with young children, in swallowing any but the most minutely divided portions.

The **senses** of **hearing**, of **smell**, and of **taste** are all more or less impaired. One very common cause of deafness is obstruction of the Eustachian tube, due to enlarged tonsils. It is not, as has been already pointed out, that the enlarged tonsils themselves obstruct the Eustachian orifice, but there is usually, with such a condition, the association of disordered secretion with

chronic hypertrophic inflammation of the naso-pharynx, and a strong tendency for the catarrhal inflammation to extend to the middle ears. In these cases also there is not unfrequently a disposition for the cerumen to be impacted.

Pain is rarely an element of chronic tonsillar disease or of enlargement; but [9]Andrew Smith has reported a case of neuralgia traceable to this cause and cured by its removal. Subjective sensations of foreign bodies in the throat, and frequent efforts to dislodge accumulation of mucus, are very frequent.

Mention may here be conveniently made of painful glandular enlargement of the neck, generally one-sided, which is sometimes but rarely caused by the presence of benign hypertrophy of the tonsils. I have seen a few such cases in which reduction of the swelling following tonsillotomy has confirmed the diagnosis.

B. PHYSICAL.—On looking into the throat, the cause of all the foregoing symptoms is at once apparent. One or both tonsils are seen to be more or less enlarged and inflamed, and in a corresponding degree to obstruct the faucial opening. They are often studded with several open crypts, some of them filled with white or yellowish-white matter: when pressure is made, this matter is seen to exude in cheesy-looking masses of very offensive odour. In the adult these open and inflamed crypts may sometimes be so large as to give rise to a doubt as to the non-syphilitic nature of the disease. A careful examination revealing other lacunæ in a less advanced state of inflammation will dispel such a fear.

C. MISCELLANEOUS.—The general health, as has been indicated, may greatly suffer from such a cause; every function of circulation, respiration, and digestion being performed in a sluggish manner, nutrition consequently becomes greatly impaired. The main cause of deterioration of health is the disturbance of the patient's rest at night. Sleep in the earlier hours is restless, and often broken by the loud snoring which will even awake the subject himself; but towards morning the sleep is very heavy, and the patient is often with difficulty aroused, this circumstance probably arising from passive congestion of the lungs, due to obstructed respiration and imperfect aëration. There is usually the history of one or both parents, and of other members of the family, suffering, or having suffered, from a similar tendency to enlarged tonsils, and the diathesis is either rheumatic or strumous.

TREATMENT of chronic lacunar disease is very tedious and unsatisfactory where the tonsils are not hypertrophied. It has been proposed to squeeze out the cheesy secretion from each diseased crypt, and then to apply solid nitrate of silver or other caustics — preferably the galvano-cautery if available — to the

cavity. Such measures are, however, but too frequently only tentative, and not of permanent benefit. It is better to treat such a case on general principles, according to the diathesis, and to give guaiacum or chlorate of potash lozenges. Whenever (as is almost certain to occur in these cases) active inflammation causing enlargement takes place, it is to be rather encouraged than arrested, and the gland then removed. I have frequently pursued this plan with the most satisfactory results. In other cases, destruction of the diseased tissue is best effected by applications of galvano-cautery, repeated as required at intervals of a week.

Chronic enlargement of the tonsils is only to be treated satisfactorily by the one method of excision, and there does not appear any valid reason why there should be two opinions on the question. The operation is simple, it is accompanied with little pain;

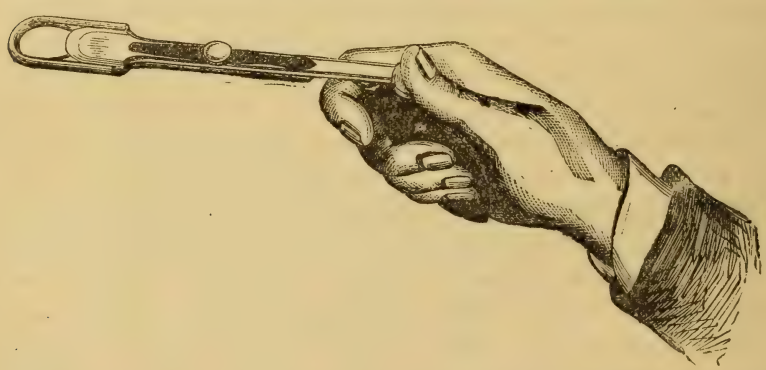

FIG. CXVI.—TONSIL GUILLOTINE, IN POSITION FOR OPERATING ON THE LEFT TONSIL.

the result is speedily and almost always of permanent benefit. All measures of local applications, 'removal without cutting' by caustic pastes, injections into the substance of the gland, are useless, and some of them barbarous. This last objection certainly does not obtain in the case of electrolysis, or in application of the continuous current without needles; but such a process is too tedious and troublesome to be recommended for general use.

Excision is best performed with a guillotine (Fig. CXVI.), the patient's head being held by an assistant, who, standing behind, at the same time presses in the gland from without, on the side on which the surgeon is operating. This avoids the necessity of employing forceps. So-called double guillotines, constructed to remove both tonsils at once, like most instruments that attempt too much, often fail to be of any use whatever. When it is required to remove both tonsils, it is better, having excised one, to

withdraw the instrument, dislodge the removed gland, and to quickly re-introduce the guillotine on the opposite side, before the patient realizes that there is a second operation, and also before hæmorrhage sets in. By this measure one operation and one sore throat only are necessary, and the risk is avoided of a young patient refusing to allow of a repetition.

Where the gland is very large, and especially where it grows down along the side-wall of the pharynx, it is not always possible to get the rigid ring quite round the tonsil. In such a case a wire-loop écraseur may be employed. The instrument here depicted (Fig. CXVII.) answers admirably for this purpose, and quite obviates all risk of hæmorrhage. I employed the galvano-cautery loop in one instance of this kind; but found that while there was no advantage over the ordinary écraseur, the after-pain of the eschar was much greater. This process is not therefore to be recommended. Very rarely indeed is there a re-development of the hypertrophy; but as such a circumstance is not outside my experience, I always endeavour to remove as much of the gland as can be pressed into the guillotine, and I would deprecate the advice of some surgeons, that the removal of a 'slice' off the tonsil is sufficient to ensure atrophy of the rest. Removal is made more easy if a guillotine or wire-loop is chosen rather *under* the size of the gland, which is thus on pressure the more completely encircled and fixed before the cut is made.

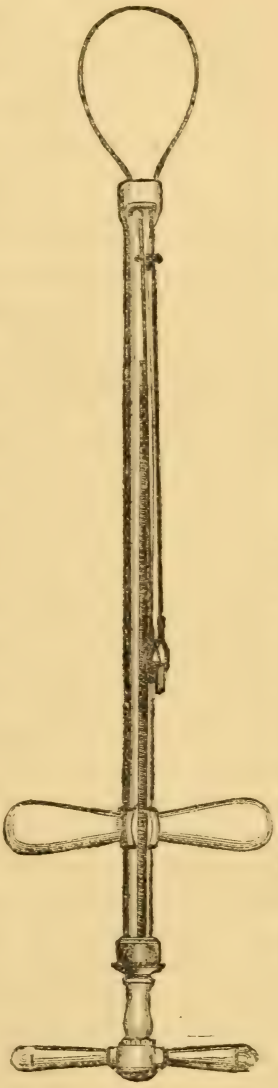

Fig. CXVII.—Wire-Loop Ecraseur for Enlarged Tonsils (Half Measurements).

Regarding the question of hæmorrhage, I can but say that it has been most rare in my experience, and I have only seen and known of three cases in my own practice and that of colleagues during a period of nearly twenty years, in which the bleeding has been serious, and only one in which it was

at all alarming. Should it occur, similar treatment to that recommended after removal of the uvula is to be adopted, namely, the sipping of a saturated solution of tannin (Form. 4). In one instance only have I seen this measure fail, and I then substituted with success the 'Styptic Colloid' (see page 219). Occasionally secondary hæmorrhage may take place a day or two after removal, but it is easily stopped. The most troublesome case I ever saw was brought about by irritation from a crumb of toast. All food, therefore, for a day or two must be soft in consistence and of mild temperature. In another instance—that of a domestic servant—bleeding occurred on the third day after removal, while she was kneeling and cleaning door-steps.

[10] Lefferts, who has treated this subject with some detail and with impartiality, takes a more serious view of the question; he thus summarizes his experience: 'That though the operation of tonsillotomy, thoroughly performed, is usually unattended by untoward result, still it is not entirely free from alarming, sometimes dangerous results; and that though these be the exception they should not be ignored; and that the surgeon must always be prepared, both mentally and manually, to cope with a hæmorrhage that may unexpectedly occur.'

The measure particularly recommended by Lefferts is pressure within the mouth and counter-pressure outside. It would not be right to omit the statement that extreme cases are on record in which the hæmorrhage after tonsillotomy has been fatal, and that in others it has been necessary to tie the common carotid. It has, however, to be borne in mind that in all, or almost all, these serious cases the bistoury has been employed in place of the much safer guillotine. It is quite impossible to determine whether excessive hæmorrhage, when it occurs, depends on an increased vascularity, due to the general hypertrophy, to an abnormally superficial distribution of the tonsillar artery, or, where a bistoury is used, to a wounding of this vessel at its anastomosis with the lingual. In view of the possibility of any of these accidents—as well as of the occurrence of other avoidable sequelæ, due to insanitary homes, in the case of operations on *out-patients*—it has for some years been a rule of my colleagues and myself to insist, wherever feasible, on residence for a few days in the hospital, or with private patients within our reach.

It may be asked, 'Is the knife or guillotine the only method of reducing the size of enlarged tonsils?' This brings me, therefore, to the measure so much in vogue in America, of galvano-cautery puncture. My general objections to this proceeding are stated at

length in the section on galvano-cautery (Chap. VII.), but I entirely agree with Knight on the advisability of adopting this method on any patient with a hæmorrhagic tendency.

The surgeon is often asked, 'Are any ill effects likely to take place after removal of the tonsils? Will the patient be more liable to suffer from cold, or to contract diseases such as diphtheria? Will the voice be likely to suffer?' To all such questions most positive answers may be given that nothing but ultimate good can follow from this operation in suitable cases.

It would, perhaps, hardly be credited that prejudice still exists against this operation, from a belief that it may arrest sexual development. Such an ignorant thought was suggested to the parents of one of my patients, *after* the operation, by a homœopathic practitioner; and the subject was even thought worthy of occupying the greater portion of a recent sitting (October, 1886) of the Clinical Society of London. It is not necessary to confute this remnant of tradition with serious argument, but it is interesting to allude to the fact that Chassaignac pointed out that while hypertrophy of the tonsils tends to arrest sexual development, their removal favours it.

ATROPHY OF THE TONSILS.

This condition, as truly stated by [11] Wagner, has been practically but little investigated. In justification it may be pleaded that it is only *hypertrophy* for which the surgeon's aid is usually sought. The disease, if such it be, is admitted to be often only discovered in the dead subject; and since it is further allowed that 'many observations go to prove that persons with congenital or acquired atrophy of the tonsils are less subject to almost all the diseases of the tonsils, especially the ordinary inflammation—diphtheritis in its various forms, and syphilis'—it is not surprising, nor to be lamented, that '*clinically*, atrophy of the tonsils has received but little attention.'

Only one variety described by Wagner under this head is of interest—that in which there is dilatation and blocking-up of the lacunæ, without corresponding adenoid hypertrophy; but this affection—known to English surgeons as *chronic follicular* (*lacunar*) *disease of the tonsils*—is well recognised, and has already received full consideration in these pages.

MYCOSIS BUCCALIS ET TONSILLARIS.

Excessive fungoid growths in the mouth, especially in the crypts of the faucial and lingual tonsils, is rather rare in this country. I have myself seen very few of such cases, and in every instance the pathological report has been that leptothrix has been the prevailing vegetable parasite present. The condition presents many features similar to lacunar tonsillitis, but the term 'mycosis tonsillaris' is usually given to any exuberant fungoid growth which not only blocks the crypts, but spreads over the surface of the tonsils and base of the tongue, but is often seen on the gums and teeth. In fact, the discharge from carious teeth is probably the pabulum on which the parasite, normally present in the mouth, attains such enormous development. The subjects of mycosis usually inhabit damp insanitary dwellings, and exhibit want of cleanliness.

The most recent case in my experience was that of an actress, who would resent with indignation such an imputation, but who was in the habit of closing the pores of her neck and face by extreme 'make up,' both on and off the stage.

Mycosis predisposes to the formation of tonsillar and probably of salivary calculi.

The TREATMENT usually adopted is to destroy the parasite by the application of the galvano-cautery point to the crypts and other spots where it is growing. If this measure is not adopted, the spots should be touched with glycerine of carbolic acid, with menthol, or with chromic acid. Antiseptic mouth-washes, together with attention to the teeth and to sanitation, obviously comprise the after-treatment.

BENIGN GROWTHS ON THE TONSILS.

These are occasionally seen. They are, for the most part, simple hypertrophies of the mucous membrane, which have become more or less pedunculated; often they take their origin at the mouth of a lacuna, which appears as if prolapsed. They may be considered supernumerary tonsils in some instances.

They offer no special points calling for particular remark; but if they occasion annoyance, a simple remedy is found in their ablation.

Calcareous concretions are not unfrequently developed in the

crypts of the tonsils, whence they are extruded or require to be removed. They were until lately considered as due to degeneration of the arrested lacunar exudation; but [12]Gruening has stated that all tonsillar concretions and pharyngeal concretions are of parasitic origin, and are composed of leptothrix elements; and that the microscopic features and chemical reactions of the tonsillar concretions are identical with those observed in the concretions occurring in carious teeth. That the origin of these formations is parasitic is undoubtedly true, but that they are also composed of broken-down mucous and epithelial matter, which becomes calcareous, cannot be denied. One such tonsillar specimen is delineated in Fig. CXVIII. They often have a coralline appearance from extension into the lacunal ramifications.

FIG. CXVIII.—CALCAREOUS FORMATION EXTRUDED FROM THE TONSIL (EXACT SIZE).

The SYMPTOMS to which these formations give rise are principally those of a foreign body, but they may induce or keep up considerable inflammation, and they also occasion great foulness of the breath.

TREATMENT consists in their removal, and the setting up of adhesive inflammation in the holes and crypts so emptied. Where the tonsil is at all enlarged, removal of a piece greatly favours permanency of cure.

CANCER OF THE TONSIL (Figs. 34 and 35, PLATE IV.; and Figs. 112 and 114, PLATE XIII.).

Malignant disease in this region is decidedly rare. I have seen only twelve cases in twenty years, or about 1 in 5,000 cases of throat diseases.

In my experience the growth has been always primary. Some authorities, however, notably [13]Mandl, say that cancer of the tonsil may be secondary. This it never is in the ordinary acceptation of the term, though the tonsil may be attacked by cancer either of the sarcomatous or epithelial variety, by invasion of the disease from the tongue or other part in its immediate vicinity. This also is rare, and I have only seen three cases of such a nature. One was that of a patient under the joint care of Mr. Lloyd, of Bloomsbury, and of Dr. Llewelyn Thomas. The appearance is delineated in Fig. 34, PLATE IV. The case is recorded in full in the twenty-ninth volume of the *Transactions of the Pathological Society of London*, before whom the patient was

exhibited when alive. He died three days after his visit to the Society, of hæmorrhage, the second in the course of the disease.

Formerly I was of opinion that the variety of cancer as it affects the tonsil was that of scirrhus or encephaloid. In neither of the cases considered as scirrhus was the pathological nature of the growth distinguishable by its stony hardness; thus, as it appeared to me, illustrating the remark of [14] Moore, that 'this character is far from being universal or pathognomonic' of this form of cancer. In two of the cases, however, the glands in the neighbourhood were characteristically indurated. There is at the present time (December, 1886) a patient—a housemaid, aged 25—under my care in hospital with such a condition; but the disease is undoubtedly a lympho-sarcoma, and later experience and the advancement of knowledge as to the varieties of cancer have taught me that these cases of so-called soft scirrhus, if the anomaly of term be allowed, are lympho-sarcomata, and that this is the most usual character of malignant disease of the tonsil. The following case is also taken from the same volume (xxix.) of the *Pathological Transactions*, and I depart from the usual plan of this work, in giving it and one or two others at length, because of the comparative rarity of the disease, and also because of the interesting clinical points involved in the histories:

Charles F., æt. 53, a carpet beater and layer, first came under observation at the Central London Throat and Ear Hospital on September 17, 1877, complaining of throat trouble, and giving the following history:

Had long been subject to catarrhal attacks in the throat, during one of which four years previously the voice had been temporarily lost. Had never suffered from any injury to the throat, nor had the tonsils ever been subjected to operation. With the exception of a gouty tendency, his family history was good, there being no evidence of any relative having suffered from a tumour, simple or malignant.

The present affection was considered to have commenced in the preceding May, when he first experienced a soreness of the throat, which had continuously increased, and had been followed a month later by difficulty in swallowing. These symptoms had recently been much aggravated. The pain was constant; was of a lancinating character, and extended from the fauces to the ears. The dysphagia had been succeeded by difficulty in nasal respiration, especially through the right nostril, from which there was a constant viscid and fœtid discharge.

Eight weeks previously the glands on the right side of the jaw had become swollen and painful. He was conscious of having lost flesh for some months.

On examining the interior of the mouth (Fig. CXIX., and also PLATE IV., Fig. 35) the mucous membrane of the whole of the soft and hard palate on the right side was seen to be uniformly and intensely congested. The right tonsil was considerably enlarged, but no fluctuation was to be discovered at any point. The soft palate and uvula were pushed

towards the left side. Behind the right posterior faucial arch and apparently continuous with the enlarged right tonsil, projected an irregular fleshy mass, reaching nearly to the middle line, extending below the level of the tongue, and obscuring the view of the pharynx; it was of a deep red colour, firm in consistence, and when first seen was free from ulceration. There were no fungating masses, and there was no tendency to hæmorrhage.

Externally there was a well-defined lobulated and firm swelling behind the ascending ramus of the lower jaw, extending posteriorly as far as a line at fall from the back of the ear, and below as far as the level of the jaw. The skin was freely movable over the swelling, and was somewhat congested. The whole mass appeared movable on the subjacent parts. The sterno-cleido-mastoid muscle was highly projected at the upper attachment. There was no pulsation, inherent or transmitted. The glands in the neighbourhood of the parotid were not enlarged, and no pain was caused by movement of the jaw. Weight of the patient at first visit was 12 stone.

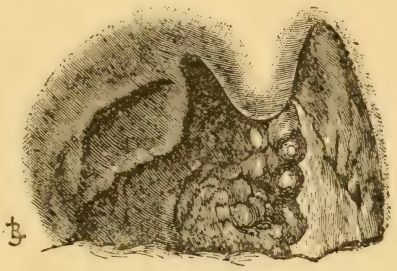

FIG. CXIX.—LYMPHO-SARCOMA OF THE TONSIL (SEE ALSO PLATE IV. FIG. 35).

On October 12, a month after his first application, the patient's condition was reported as having steadily deteriorated; his expression was worn, and his countenance was very anæmic, though he had lost no blood from the mouth, nor had he suffered from any other hæmorrhage. He experienced great pain in swallowing, and at other times, so that he was quite unable to masticate; his breathing also was more obstructed. The growth had become more prominent in the fauces; there was much saliva secreted, and there was very marked and characteristic fœtor of the breath. An irritative cough gave him much trouble, and his rest was greatly disturbed thereby. His weight had decreased 4 lb.

A piece of the growth was removed by means of the galvano-cautery loop with but little pain, and with very trifling hæmorrhage. The piece removed weighed about 3 drachms, was of a greyish-yellow colour, mottled, with purplish spots. At one point it showed commencing ulceration. The mass was slightly lobulated, and was freely supplied with bloodvessels. The central part was of dark apple-jelly colour, semi-transparent, and elastic in consistence. Microscopic examination confirmed the diagnosis as to the malignancy of the growth, which was thought to be encephaloid in character.

Twelve days later (October 24) the patient expressed himself as much relieved; swallowing was attended with less pain, and breathing was easier. His weight showed a decrease of 2½ lb. since the last date.

On November 1, another piece of the growth was removed, having much the same character, but more ulcerated. The operation was again followed by considerable relief. Deglutition was easier, the lancinating pains were seldom experienced, but the patient complained of a dull heavy pain over the right ear and side of the head.

He visited the hospital on December 23, walking both to and from his house, the distance of both journeys being fully two miles. His weight was 10 st. 2 lb., showing a decrease of 26 lb. in ninety-eight days. He had lost 7 lb. in the last fourteen days.

On the evening of the 24th (that is, on the day after his last visit to the hospital) a sudden attack of hæmorrhage took place, and death was reported as having ensued in less than a minute.

Autopsy made Sixty-three Hours after Death by MR. G. R. STEIL.—The larynx and pharynx with the tongue and the cervical swelling were removed entire.

The cervical tumour was marked by a shallow groove running downwards and out-

wards, and dividing it into a posterior upper and an anterior lower and larger part. Above the mass, lying in front of the internal jugular vein and against the pharyngeal wall, was seen the spinal accessory nerve, which, passing beneath the upper part of the tumour, emerged at the groove. The posterior division of the mass was firmly attached at the upper part of the base of the skull and the transverse processes of the upper two vertebræ; in front of it was the styloid process of the temporal bone. The anterior and larger division, ovoid in shape, was partly covered by the sterno-cleido-mastoid muscle. Above it lay the posterior belly of the digastric and the stylo-hyoid muscles; below it was free, whilst in front it merged into the thickened and infiltrated pharynx. The tumour was of a smooth, slightly lobulated surface, of a pinkish-yellow colour, and semi-elastic to sense of touch, giving the idea that it contained fluid. On section it was at first firm, but the centre part was softer. It was of a yellowish-grey colour mottled with pink. On pressure there was characteristic juicy exudation. There were a few smaller, enlarged, and indurated glands in the neighbourhood.

The common carotid artery, with the internal jugular vein and accompanying nerves, were pressed back and lay beneath the tumour; the external carotid was seen to emerge from behind it at its upper border. Anteriorly it was pierced by the superior laryngeal and the lingual arteries.

The whole of the soft palate and the upper walls of the pharynx were thickened and infiltrated. The tonsillar mass, which originally projected from behind the posterior arch of the palate, had become greatly reduced by sloughing, which had also attacked the right pharyngeal wall. Several vessels were seen to be dissected by the ulceration in the wall of the pharynx, but even on most careful examination no arterial branch, tonsillar or pharyngeal, was traceable from the facial to the ulcerating and sloughing parts; so that it was impossible to say exactly whence the hæmorrhage had proceeded. The larynx was healthy, and the tongue also was uninvaded. No other organs were permitted to be examined.

Report of the Committee on Morbid Growths.—The parts forwarded to us consisted of a piece hardened in chromic acid, some pieces of diseased gland in glycerine, and the tongue, larynx, and adjacent parts in spirit.

The latter parts are the seat of a large soft growth which, springing from the right side in the neighbourhood of the tonsil, infiltrates and thickens the posterior wall of the pharynx and the soft palate. The posterior walls of the pharynx and the tonsillar region show a ragged sloughy surface.

Under the microscope all these parts have a very similar structure. The stroma forms a delicate reticulum, enclosing small cells with single nucleus, and occasionally much larger cells also with single nucleus. In the tonsillar region the cells, though small, are decidedly angular; in the glandular mass outside it they are mostly circular. This difference in the shape of the cells appears to be a local accident, due rather to mutual compression than to any essentially different type of growth in the two parts, and we consider the disease to be a lympho-sarcoma. The nature of the growth, and the absence of any tonsil structure, make it probable that the latter may have been the original seat of the disease.

March, 1878.

Primary epithelioma of the tonsil is, although rare, not unknown, and three cases have occurred in my own practice.

The first was exhibited as a living specimen at the Pathological Society, December 3, 1879, and is recorded in vol. xxx. of the *Transactions*. The patient was an engine-driver of temperate habits, who, until within the last year, had enjoyed good health, with the exception of temporary sore throat on the same side as now affected seven years previously. He had been treated at various hospitals, chiefly, as it appeared, for syphilis,

and he applied at the Central Throat and Ear Hospital on November 21st. The following were the principal points in his condition: He was pale and evidently emaciated, weighing 110½ lb. as against 126 lb. six months previously. His general health and appetite were poor; his pulse 92. Both voice and articulation were slightly nasal; his left nostril was obstructed, but there was no impediment in oral breathing, nor in the mobility of the tongue. His breath was very fœtid. He stated that swallowing of solids had become impossible, and that he lived principally on bread and milk and soup. His sense of taste had become impaired. He complained of a shooting pain starting below the ear as soon as he got warm in bed, with considerable pain in taking food if he attempted to swallow it at all hot. His family history was good. He denied having had syphilis.

On examining the mouth it was seen that the left half of the soft palate and corresponding tonsil and faucial pillar were occupied by an almost white, but, in parts, slightly pink, fungatory growth extending from the left side of the tongue and for a considerable distance down into the pharynx. The uvula, as will be seen by reference to the drawing (Fig. CXX.), and to the coloured illustration (Fig. 114, PLATE XIII.), was much pushed to the right of the mesial line, being on a perpendicular level with the second right bicuspid. The new growth was closely connected with the lower jaw, and the tissue of the soft palate around it was red and swollen, but not indurated. Beneath the left angle of the lower jaw was felt a hard fixed lump (glandular) extending to the top of the hyoid bone.

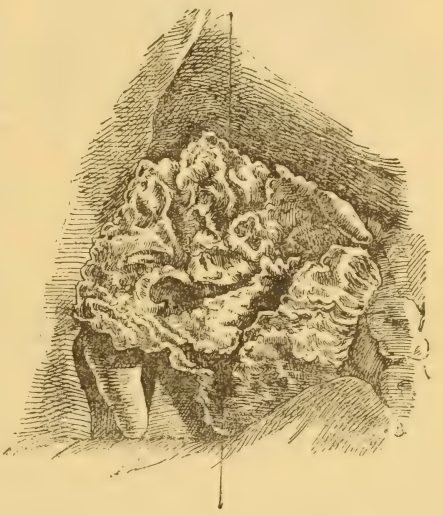

FIG. CXX.—PRIMARY EPITHELIOMA OF THE TONSIL.

A portion of the growth was removed by means of the galvano-cautery loop and submitted to microscopic examination, which showed it to be composed of abundant proliferation of epithelial cells with but scanty-celled stroma. The patient remained under treatment for ten months: large pieces of the growth were removed by the galvano-caustic loop or by ordinary wire écraseur almost each week, at the express desire of the patient, who experienced great relief thereby in both his breathing and swallowing. Nevertheless the disease progressed, and finally involved the base of the tongue, epiglottis, and angle of the jaw. He kept at work till three months before his death, which took place fifteen months after his first visit to the hospital. He died at his own home, and an autopsy was not obtainable.

I have also been recently in attendance, in conjunction with Dr. White, of Retford, on a gentleman, aged 60, the subject of an indurated warty hypertrophy, with ulceration of the right tonsil and uvula, which has all the characters, macroscopic and microscopic, of epithelioma.

Another instance of epithelioma not exactly in the tonsil, but in its immediate neighbourhood, is delineated in the accompanying figure (CXXI.), and also in colour as Fig. 112, PLATE XIII.

The drawing was made from a patient whom I only saw once in February, 1879. He was a man of 52 years of age, who had always enjoyed good health until within the last three or four months, since which time he had experienced pain in swallowing. He had not become thinner. Both nares and larynx were slightly congested. The patient stated that he had always been a great snuff-taker.

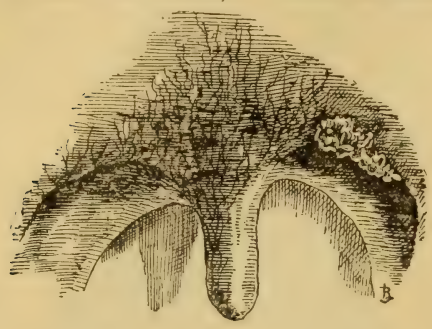

FIG. CXXI.—EPITHELIOMA OF ANTERIOR PILLAR OF FAUCES.

On examining the mouth the whole of the soft palate was seen to be unduly hyperæmic, capillaries coursing over its surface as shown in the illustration. There was a small warty growth about the region of the anterior pillar, and was of such a character that I had no difficulty in diagnosing it as an epithelioma. The patient allowed me to remove a fragment for microscopic examination, which entirely confirmed my belief in the malignancy of the disease; but I could not induce him to have the little growth removed, nor have I been able to ascertain any details of the further progress of the case. It should be mentioned that there were no enlarged glands, but there was distinct tenderness on external pressure under the angle of the left jaw.

In the case of Charles F., the cervical glands, though much enlarged, were by no means hardened. Microscopic examination of portions of the tumour which were removed on two separate occasions during life, gave undoubted evidence of its malignant nature, and this opinion was confirmed after death.

In some instances there is, especially in the early stages, but little apparent enlargement of the tonsil itself, since infiltration of the surrounding tissues obscures any definition of the tumour. So much is this the case, that a correct diagnosis is generally arrived at rather from a careful consideration of the general and commemorative signs than of the subjective symptoms, or from the physical examination of the gland itself.

Thus all functional symptoms, as well as all physical signs, will bear a strong analogy to those of any inflammatory tonsillar affection. **Voice** will be thick, **articulation** impeded, **respiration** obstructed, **deglutition** painful, and the special senses of **smell** and **taste** impaired. Physically there will be redness, thickening with displacement, possibly ulceration and disorder of secretion. Examining more closely, we shall find that the **pain** of malignant disease is much more severe than in any benign inflammation of a chronic character. It is, in point of fact, very like the pain of quinsy, only lasting for months, instead of for four or five days, and is only second in intensity to that which sometimes accompanies tuberculous ulceration in the same region. Pain in the ears, so characteristic also of similar disease in the larynx, is a

distinctive symptom, and deafness and tinnitus are often present. The **colour** of a sarcoma is generally of a dusky, livid red, with infiltration extending far beyond the ordinary bounds of inflammation, and with patches of ulceration or granulations; the tumour of an epithelioma is of paler tint, and is fairly well rendered in the coloured illustrations, especially those on PLATE XIII.; the **secretion** will be thin and sanious, not thick and cheesy, as in lacunar inflammations of benign character, and it will be very offensive. It will require to be constantly cleared from the mouth, and will also be discharged freely from the nostrils.

The general health speedily suffers, nutrition is impaired, and the patient steadily loses weight. This loss of weight is regarded in my practice as a distinctive feature of the first importance. In the case alluded to, as brought to me by Dr. White, an opinion had been repeatedly expressed by another specialist that the case was one of syphilis. The patient had lost a stone in weight in the three months previous to seeing me, the effect, as he was assured, of iodide of potassium: when I saw him he weighed over 16 stone, and the patient had been rather congratulated on his loss. In twenty days which elapsed before his next visit he lost 6½ lb., and this sign enabled us to definitely confirm the doubts we had felt as to the correctness of the diagnosis of the malady as syphilitic.

DIAGNOSIS.—It is often said that the error of mistaking cancer of the tonsil for syphilis is a very pardonable one, as the marks of difference between the two diseases are by no means distinct. Indeed, this was once said by the President for the time being of the Pathological Society, on the occasion of my exhibiting a case of cancer. I ventured to dissent from that view, and stated that though the patient's own account may not by any means exclude the possibility of a co-existent syphilitic dyscrasia, the method in which the two diseases affect the tonsil (or, indeed, any other part of the throat) is wholly distinct. To more particularly emphasize these differences I have contrasted the chief features of the two diseases in opposing columns:

SYPHILIS.	CANCER.
Functional Symptoms. — Swallowing sometimes difficult, but never impossible, though occasionally leading to return of fluids through the nostrils; the sensation is essentially one of discomfort rather than pain, with entire absence of pain when the parts are at rest.	*Functional Symptoms.*—Dysphagia, as it is the first, is also the prominent symptom, and increases in severity so as to lead to total inability to take food. Acute lancinating pain is a prominent and almost constant symptom.

Syphilis—(*continued*).	Cancer—(*continued*).
Physical Signs.—The tonsils are generally affected by syphilis in its earlier (secondary) stages by deposits on their surface of mucous patches; in the advanced stages (tertiary) syphilis attacks the gland as a perforating ulcer. There is but slight sympathetic glandular enlargement, which is not painful and subsides with the cause of irritation.	*Physical Signs.*—Cancer, whatever the form, is always manifested in the tonsils as a new growth, which attains considerable size before the occurrence of ulceration. There is considerable infiltration and induration of neighbouring glands, which become as painful as the primary seat of disease.
Hæmorrhages are rare.	Hæmorrhages are frequent and profuse, and are often the immediate cause of death.
Emaciation, if existing, is only in proportion to diminished nutriment taken.	Rapid emaciation commences long before dysphagia is by any means extreme, and advances even with relief of symptoms.
Therapeutic.—Most amenable to appropriate treatment.	*Therapeutic.*—Advances in spite of every measure, medicinal or surgical.

There is but little likelihood of cancer in the tonsil being mistaken for any other disease. Its points of differentiation from benign inflammations were detailed at page 247.

Prognosis, it need scarcely be said, is most unfavourable, although the progress of the disease may be very slow, and the patient experience temporary relief on occurrence of ulceration or hæmorrhages. With advance of the malady the sufferer becomes painfully depressed, and at an early stage presents the well-known signs of the cancerous cachexia.

Death occasionally occurs suddenly, and is in that case generally due to hæmorrhage or to sudden secondary œdema of the larynx. An instance of this latter kind occurred in 1877 at the Central Throat and Ear Hospital.

The patient, a man æt. 44, was admitted on account of a malignant ulceration at the base of the tongue, not involving either larynx or tonsil; but there was an enormous indurated mass at the side of the neck, extending from the angle of the jaw right down the length of the trachea. The man died suddenly with barely a spasm, and on post-mortem examination œdema of the epiglottis and left ary-epiglottic fold was found. The larynx was otherwise healthy, except that the left recurrent nerve was inextricably involved in the mass, and there was wasting of the left posterior crico-arytenoid muscle.

Other modes of death are by gradually progressive systemic cachexia and by inanition.

Treatment.—Temporary, and even considerable, relief may be given by the removal of portions of the tumour by means of the écraseur or galvano-cautery; but there are no means of eradicating the disease, or even of otherwise arresting its slow and certain march to a fatal issue. Recorded experience of the operation of resection of a portion of the jaw in the hands of others has not yet induced me to recommend, much less to perform,

it. As palliatives, the local internal application of chloride of zinc, iodine, iodoform, or iodol (Form. 56, 64, 65), may be recommended, with external applications of chloral (Form. 58) or of belladonna. The painting of a five or ten per cent. solution of cocaine internally, and injections of the same or of morphia hypodermically, are also recommended. The benefit of this remedy is, however, somewhat discounted by its tendency to increase salivation; and in such circumstances a spray, wash, or lozenge of menthol may be usefully substituted. Sedatives applied to the external auditory meatus will in some instances relieve the distressing ear-ache.

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CHAPTER XII.

DISEASES OF THE LARYNX: ANÆMIA, HYPERÆMIA.—CLASSIFICATION OF LARYNGEAL INFLAMMATIONS.

THE larynx is subject to all the affections peculiar to a mucous tract, with certain additional disorders due to its structural arrangement and its functional purposes: thus we have anæmia, hyperæmia, congestions, inflammations, ulcerations, and cicatricial deformities, with thickenings due to submucous deposit. All these are either of a simple character, or associated with some specific poison, and both are acute and chronic.

Any interference with innervation of the muscles which either open or close the rima glottidis will lead to disorder of both respiration and vocalization; or the chink may be narrowed by inflammatory thickening, membranous exudation, cicatricial adhesion, or new formations. The framework of the larynx being composed of cartilages and their articulations, morbid processes may extend to these tissues, leading to ossification, anchylosis, caries, and disintegration.

Lastly, external disease may by compression diminish the calibre of the larynx, or it may invade the canal itself; in either case interfering with the free passage of air, and possibly leading to the introduction of noxious foreign matter.

A few notes on the general structure of the larynx will be of service towards appreciation of changes made by disease.

Commencing with a more minute description of the histology of the mucous membrane than was given in the preliminary remarks on its anatomy (p. 20) we find that—

I.—The greater portion of the larynx has a lining of stratified columnar ciliated epithelium. Interspersed are a few goblet cells, and here and there the openings of the mucous glands.

II.—A basement membrane.

III.—The mucosa, which consists of a meshwork of fibrous connective-tissue, with more

or less adenoid tissue, the latter being sometimes aggregated to form lymph follicles: these are, however, not nearly so numerous as in the tonsils and pharynx. In this mucosa are contained the lymphatics and the smaller branches of vessels and nerves.

IV.—The submucosa, composed of tissue of the areolar variety, with a certain amount of adenoid stroma: in it is situated fat-cells, mucous glands, and the larger vessels and nerves.

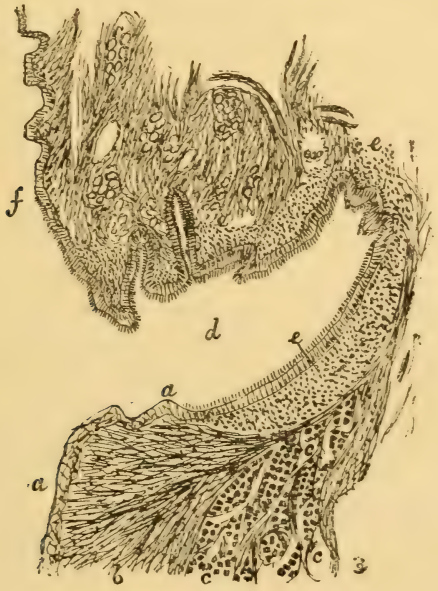

FIG. CXXII.—SECTION OF VOCAL CORD AND VENTRICLE, MAGNIFIED ABOUT 45 DIAMETERS (AFTER [1]KLEIN).

a. Vocal cord, with covering of stratified pavement epithelium.
b. Elastic fibrillæ of the same.
c. Section of thyro-arytenoid muscle.
d. Ventricle with stratified columnar ciliated epithelium.
e. Adenoid tissue (laryngeal tonsil).
f. Ventricular band, with epithelium of both varieties.

Variations of the structure will be found in the following regions:

On the epiglottis, the vocal cords and the superior surface of the ventricular bands, the epithelium is of the stratified pavement variety.

The mucous glands and adenoid tissue are most prevalent on the ventricular bands; that is to say, on the most lax portion of the lining. They are entirely absent on the vocal cords, which are composed solely of a layer of stratified pavement epithelium, a distinct and firmly adherent basement membrane, and elastic fibrillæ.

ANÆMIA OF THE LARYNX (Fig. 68, PLATE VIII.).

When a patient is suffering from general anæmia, whether due to hæmorrhagic loss or chlorosis, from Bright's disease or diabetes, the capillary supply to the larynx may of course be diminished, in common with that to the rest of the body; and this affection, therefore, does not require particular notice. The cases in which laryngeal anæmia is of significant importance are: 1. When it is

associated with functional aphonia; 2. When, during the course of an attack of chronic laryngitis, the mucous membrane covering the ary-epiglottic folds, arytenoid cartilages, and ventricular bands is abnormally pale, while the vocal cords are the seat of indolent congestion, the patient not being generally anæmic. In both these cases the condition may be the premonitor of laryngeal tuberculosis; it will, therefore, when so occurring, be more properly considered in the chapter on that disease.

The laryngeal mucous membrane may partake of the characteristic change of the cutaneous surface observed in cyanosis and in jaundice.

TREATMENT must naturally depend on the primary cause, and all local measures, as stimulating inhalations, lozenges, etc., should be secondary to general tonic remedies.

HYPERÆMIA AND HÆMORRHAGES OF THE LARYNX.

This condition seldom occurs except as the precursor or sequel of inflammation, congestion of the laryngeal mucous membrane being usually due to catarrhal influences. Active hyperæmia is also observed in the larynx of persons in habitual use of the voice; of those addicted to chronic alcoholism, or to the excessive use of tobacco; of those working continuously amid acrid chemical fumes, as of phosphorus and the corrosive acids or alkalies, smoke, dust, or in ill-ventilated rooms overcharged with carbonic acid gas. In these the congestion, though not always reaching the stage of disease, renders the subject thereof most prone to contract more acute inflammation.

As first pointed out by myself many years ago, the larynx of most voice-users is in a state of active hyperæmia of varying intensity, without the existence of any pathological symptoms. This circumstance, however, will explain one of the predisposing causes of this class to laryngeal inflammations.

PATHOLOGY.—The various regions of the larynx differ widely in the amount of hyperæmia they exhibit, and such differences depend in most part upon the relative thickness and tension of the mucous covering and the structures lying immediately beneath. Hyperæmia is always more diffuse and pronounced where the submucosa is loose, fat, and thick, as upon the ary-epiglottic folds, the false cords, ventricular bands, and the ventricles; whereas over the epiglottis, true cords, and inferior cavum of the larynx, only comparatively slight differences in colour are to be observed even in congestions of rather high grade. Besides being present in all acute processes, hyperæmia of the mucous membrane of

the throat is an almost invariable accompaniment of the exanthemata. Slight ecchymoses frequently happen during active hyperæmia, but otherwise hæmorrhage is of rare occurrence except from mechanical injury. A case has been reported by [2]Türck, in which hæmorrhage resulted from syphilitic ulceration in the sinus pyriformis, leading to corrosion of the lingual artery. This is the only instance recorded of such an accident, though many authors mention the possible danger of its occurrence. Hæmorrhages are not infrequent in carcinoma, and are occasionally witnessed in phthisis. A case in connection with the last-named disease is illustrated in PLATE VIII., Fig. 69.

Another interesting instance of this rare condition is illustrated in PLATE XIX., Fig. 118. It was probably an example of what [3]Navratil has termed *Chorditis hæmorrhagica.*

The subject was a young girl, Charlotte Y., aged 18, by occupation a seamstress, who was seen by me at the hospital, in February, 1879, in conjunction with my former colleague, Mr. Hamilton. She applied on account of complete loss of voice, and the appearance presented in the picture was seen on laryngoscopic examination, viz., general anæmia, with the exception of the vocal cords, which were coloured with moist blood. On wiping the hæmorrhagic covering away, the cords were seen to be markedly hyperæmic. There was but little history obtainable, except that of poor feeding and general debility with amenorrhœa. The patient stated that she had often tasted blood, and had spat a little into her handkerchief at early morning, but had never had further evidence of hæmoptysis. The lungs were weak, but not actively diseased.

The girl improved under internal administration of iron and ergot, and her voice was restored as her strength was regained; but except on her return from a Convalescent Home, she was not again seen.

Venous congestion is by no means so infrequent as is generally stated. I have seen engorgement of the venous plexus which is encased in the mucous folds that bind the tongue to the epiglottis, in cases of mitral insufficiency, as remarked by Dickson. Passive hyperæmia is likewise seen in emphysema, and it may also be caused through the pressure of external tumours, by severe cough, and by anything leading to straining or forcing of the vocal or respiratory functions. It has been already noted, at page 208, that a hæmorrhoidal condition of the veins at the base of the tongue is a cause not generally recognised of many throat troubles hitherto considered as of a purely subjective nature. It is perhaps needless to mention that in icterus, as well as in gangrenous processes in the lungs, the lining membrane of the pharynx and larynx takes on that discoloration in which all other mucous surfaces then participate.

SYMPTOMS: FUNCTIONAL. — The **voice** is generally somewhat hoarse; **respiration** is unembarrassed, unless there is nasal or pharyngeal stenosis; **cough** exists rather as result of a desire to clear the throat of supposed irritation than

from more direct cause; and pain with sensation of dryness or of a foreign body is experienced.

Objective symptoms are at once revealed by the laryngoscope, and consist of increased coloration of the mucous membrane in varying degrees of uniformity and intensity. The degree and situation of varix are always to be verified by direct inspection or by the laryngeal mirror.

In the case of hæmorrhage the source of bleeding may sometimes be accurately ascertained, as is seen in the illustrations in Plates VIII. and XIV.

Progress and Duration.—Neglect of a congestion of the larynx is likely to lead to subacute or chronic laryngitis, and may be a predisponent to even more severe grades of inflammation. A hæmorrhage from the larynx is almost invariably indicative of serious disease.

Treatment should in the case of secondary hyperæmia be modified according to the cause, with adoption of measures, local and general, of much the same nature as recommended for chronic laryngitis (p. 276). In hæmorrhages, insufflations of alum or introduction by the laryngeal syringe or brush of solutions of persulphate of iron, half to one per cent., are preferable to similar applications of tannin. [4]Stockman's recent experiments have shown that the action for good of this last-named drug depends on its power of precipitating albumen, the layer of tannate of albumen which is formed acting as a protective to the underlying mucous membrane; but it has also been shown by [5]Rosenstirn and [6]Fikentscher that tannic acid when locally applied, so far from causing contraction of bloodvessels is actually followed by their dilatation. Internal administration of tannic and gallic acid has also been proved to be of no effect on the respiratory mucous membrane. In cases, therefore, of laryngeal hæmorrhage iron and ergot are preferably indicated.

INFLAMMATIONS OF THE LARYNX.

Much confusion has been occasioned in the classification of inflammatory diseases of the larynx, by the want of agreement on the part of various authors as to the significance of terms. It is here proposed to arrange laryngeal inflammations in separate order, principally in relation to the nature of the structure involved, each in its acute and subacute or chronic form, and to the individual character of the morbid process.

The laryngeal complications occurring during the course of certain continued fevers and of the exanthemata vary in nature

and degree proportionate to the characteristics and gravity of the primary disease, and no practical advantage is to be gained by a separate description of each of these secondary inflammations as if it were a different malady. Nor does it seem necessary to recognise as distinctive diseases, varieties of submucous inflammations dependent on the nature of the infiltration. It is quite otherwise with the laryngitis associated with syphilis, tubercle, etc., in which the etiology, pathology, and the whole course of the malady are of such a *specific* nature as to demand distinct consideration, and quite special methods of treatment. But between simple non-specific and specific inflammations there comes a class—the exudative or membranous—which may be considered, to some extent, common to both, including, as it does, simple membranous laryngitis (croup), which may be idiopathic or traumatic, and diphtheria, which is distinctly specific.

The following is the proposed arrangement:

A. Simple, Non-specific Inflammations.

I. Of the Mucous Membrane.

1. Acute.
2. Subacute.
3. Chronic.

II. Of the Submucous Tissue (*œdema*).

1. Acute.
2. Chronic.

III. Of the Perichondrium and Cartilages.

1. Acute.
2. Chronic.

B. Exudative or Membranous.

1. Idiopathic (*true croup*).
2. Traumatic.
3. Specific (*diphtheria*).

C. Specific.

I. Syphilitic.

1. Secondary.
2. Tertiary.
3. Congenital and hereditary.

II. Tuberculous.

III. Lupoid.

D. Neoplastic.

1. Benign.
2. Malignant,

And to terminate the category of laryngeal diseases, we shall finally consider the neuroses of this region.

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272	4	STOCKMAN.	*British Medical Journal*, Dec. 4, 1886.
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CHAPTER XIII.

INFLAMMATION OF THE MUCOUS MEMBRANE OF THE LARYNX.

1. ACUTE LARYNGITIS.

Synonyms.—Mucous laryngitis; Catarrhal laryngitis. (Figs. 48 and 49, Plate VI.)

Acute inflammation of the lining membrane of the larynx differs in no particular from that of any other mucous surface, except inasmuch as may be due to the varying relations of tension and thickness of the different portions of the subjacent structures. This influence is exercised to a less extent in the mucous than in the submucous variety of inflammation.

The disease has also some features of distinction according to the age at which the attack occurs. It is decidedly a more dangerous malady in children than in adults; happily it is far less frequent. An attempt has been made by some authors to treat the laryngitis of children as a separate affection, on account of certain differences in its morbid anatomy. Such differences are believed by me to be due to the greater tendency in the young to plastic exudation as a result of simple mucous inflammations, of which thrush, aphtha, and plastic bronchitis may be cited as examples, and not to any definite pathological changes distinctive from those of a laryngitis when exhibited in a person of full age. Probably, however, the small size of the larynx in the child may also influence the severity of infantile laryngitis.

Etiology.—As the most commonly accepted name implies, *catarrhal* influence is the strongest predisponent of this form of laryngitis. The general circumstances which give rise to the catarrhal state have been fully dwelt on in Chapter VIII., and need not be again enumerated as applied to mucous laryngitis; but in considering the various predisposing and exciting causes of catarrh as it may affect the larynx, it is necessary to keep always

in view its two most important functions—that of respiration and that of vocalization. The duty of the epiglottis in deglutition is hardly at all affected in simple catarrhal inflammation, and need not therefore enter into present consideration.

It is generally stated that the exciting causes of a mucous laryngitis are similar to those which lead to the œdematous form, only that they are modified by the intensity of the factor, or by action on a system less receptive of the baneful influence. Successive authors, following their predecessors, have taken no trouble to ascertain whether the nature of the 'cold-catching,' or catarrhal factor, has any influence on the character of the resulting inflammation; and we thus find the same atmospheric and hygienic causes ascribed indiscriminately as predisponents or excitants of every variety of laryngitis. In attempting to differentiate them, I do not venture to speak dogmatically, since my views are offered rather as suggestive reflections on past experience, for future correction or confirmation by others, than as the ascertained results of systematized investigation.

First in importance amongst the causes of mucous laryngitis are the atmospheric, the principal of which is the inspiration of moist cold air, especially by those who habitually breathe through the mouth, or in the subjects of temporary **nasal stenosis.** [1]Gottstein considers that 'no mucous membrane, except that lining the nose, is so prone to inflammation, as a result of climatic influences, as that of the larynx.' I quite agree with this opinion, with the modification that the major proportion of laryngeal catarrhs are the direct result of nasal obstruction, and that propagation of acute inflammation from the nose to the larynx is, in my view, second only in frequency to the direct inspiration of noxious atmospheres by the mouth. I am inclined to doubt whether, as generally stated, a laryngeal catarrh ever really ascends to the nose, giving rise to a secondary nasal catarrh. Differing from generally accepted statements, I have not found that exposure to keen winds, the inspiration of dry cold air, or of hot air, or of changes from heat to cold, *unaccompanied by moisture*, act specially as etiological factors of catarrhal laryngitis.

The influence of wet clothing, of body or feet, is the next hygienic cause commonly assigned; but its direct influence in producing a laryngitis rather than a rheumatism or any other form of inflammation is often, though not invariably, regulated by certain functional circumstances. It is not always necessary for the individual to have been using his voice during the time of exposure, but a laryngitis will preferably occur as a result of such a

factor in one whose profession necessitates much use of the larynx in speaking or singing, especially if nasal respiration is impeded.

The following case illustrates the influence of exposure to damp and the retention of wet clothing as conducing to laryngitis, with but very slight predisposing circumstances of excessive functional activity of the larynx:

Major C., of the Royal Engineers, consulted me by the advice of Mr. Pittock, of Margate. He had come home after long service in the Bengal Presidency, on sick leave from Indian fever, travelling by way of America. He had suffered for some time from pharyngeal irritation, which was increased by taking cold after walking under the Falls of Niagara, when he was freely besprinkled with water. He thinks he may have shouted a little to make his voice heard over the noise of the falls; but not till next day did he suffer, when he felt increase of the throat irritation, and spoke with a hoarse voice. With a day or two of careful nursing he was quite convalescent. He arrived home, and a few weeks later went to Scotland, when a more serious relapse occurred. This was brought about by the checking of heavy perspiration, induced by a long walk across the hills, at the end of which he commenced fishing. Although he was protected from wet in wading, he felt a distinct chill, to be followed the next day by acute inflammation of the larynx, from which he suffered for several weeks. When I saw him the disease had become subacute.

And next, as to use of the voice as a cause of laryngitis. Doubtless functional activity of the larynx, leading to hyperæmia of its mucous lining, may add to a certain extent as a predisponent; but a careful analysis of a number of cases has assured me that the atmosphere in which the patient has spoken, and especially the method of his elocution, are far more important factors, and that the immunity of the individual to attacks is in proportion as these conditions are favourable to functional health. In this way may be explained another frequently assigned predisponent—previous attacks—these occurring especially in the case of those in whom the importance of the above-named circumstances is either unrecognised or neglected.

The following case, which recently occurred in my practice, is a typical illustration of an almost everyday experience in this direction:

Mr. A., aged 31, had used his voice but moderately in public till May, 1885, when he became a candidate for a seat in Parliament. He had never had instruction in elocution, and was called on to speak at meetings twice or thrice a week. In October he endeavoured to address a gathering of 5,000 to 6,000 in a covered drill-shed. He was sensible from the commencement that he had a difficulty to reach his audience. He therefore shouted with all his force. The result was that he felt his voice go before he was half through his speech. He was hoarse the whole of the rest of the campaign, till his election in December, when he placed himself under treatment of a specialist, who told him he had 'strained his vocal cords.' His voice did not entirely recover till after a course of two or three months of bi-daily inhalations, and almost daily insufflations, combined with absolute rest of the organ. Another election campaign was commenced in June, and his voice served him well until attendance at a small meeting—not more than 600 or 700—in a gas-lighted and ill-ventilated hall. Here he sat for an hour and a half

before his turn to speak arrived, and again he felt his voice fail him, and a sense of fatigue after a comparatively short address. He drove home—twelve miles—in a closed carriage, with open window. The next day his voice was fairly well, but the day following it was quite gone. As soon as he was able to leave his room he came to town, and was seen by me. The larynx was still in a state of subacute inflammation, with considerable pharyngeal congestion and relaxation.

In almost all cases of laryngitis a low state of the system is a predisponent cause, and constitutes one explanation of the frequency of laryngeal and pulmonary inflammations incurred after exposure at funerals; the grief and depression of bereavement, following in some cases on long and anxious watching, having weakened the powers of resistance against noxious exciting causes.

An example of this nature presented itself in the person of

Mr. L., aged 50, a schoolmaster, who having, since the age of 15, been engaged in teaching, had for many years suffered from slight throat trouble in winter and a frequent feeling of vocal fatigue, from which, however, he had always recovered after a summer holiday spent in his native air of Wales. A severe attack of laryngitis quickly followed return to work after a vacation, which had been occupied entirely in nursing a sister and a mother through fatal illnesses.

A constitutional defect in assimilation and a previous low vitality are, of course, recognised as predisposing to all forms of laryngeal inflammation, and it only remains to point out that such a state may be cultivated by 'overcoddling' the body; this being quite as possible in the adult as in the child.

Laryngitis is more frequent in the male sex than the female, and in those of full age than in childhood. On the other hand, as previously stated, the disease is of greater gravity in the child than in the adult. Independently of that most important influence—professional use of the voice—occupation predisposes to laryngeal catarrh in relation to the ventilation of the workroom and the variation in the temperature and other characteristics of the atmosphere, the irritation of chemical fumes, noxious gases, and all forms of dust acting as direct causes. The more detailed observations under the heading of occupation, which were given when enumerating the causes of pharyngitis (p. 166) may be applied to the affection under present consideration. The same may be said of the influence of alcoholism, tobacco smoking, and other dietary faults and excesses.

Of the exanthemata and continued fevers which predispose to mucous laryngitis, the principal are measles, variola, scarlatina, and typhoid. In the first-named, laryngeal inflammation may be an early complication of the general disorder. In the others it is a later manifestation, and not unfrequently of a more serious type. The laryngitis of chicken-pox and rötheln is always that of the mild catarrhal type. Of traumatic causes, irritant poisons,

scorching flame, scalding water and steam, are capable of inducing either the œdematous or the mucous form, and provided the effect be quickly counteracted, the inflammation may be of the milder character. With children there is usually membranous exudation (croup).

PATHOLOGY.—The morbid changes of the laryngeal mucous membrane in simple laryngitis consist, in the first instance, in an active hyperæmia, leading to swelling of the tissues, and resulting in disorder of the mucous secretion. As a rule the inflammation is spread uniformly over the whole of the tissues of the larynx (Fig. 48, PLATE VI.); degrees of severity depending rather on differences of grade than of extent. But it sometimes happens that an acute catarrh is strictly limited to quite special regions, whilst the rest of the larynx remains to all appearance entirely or comparatively normal (Fig. 49). Thus Türck, Ziemssen, and Stöerk all speak of an *epiglottitis*, an *arytenoiditis*, and a *chorditis* as special affections. These distinctions have also been adopted by Cohen. They are of no particular practical value.

At the commencement of the inflammatory process the secretion is somewhat arrested, and consists of a glairy fluid, rich in mucin, and containing few epithelial cells. Later, the secretion becomes more abundant, and conveys large masses of epithelial detritus. Before the infiltration causes desquamation of the epithelium, the individual cells become white and opaque, constituting the condition known as *cloudy swelling*. This appearance is not due to hypertrophy of the epithelium, as occurs in the condylomata lata of syphilis, but is caused by the rapid decay of the new cells generated under increased blood-pressure, and to granular changes in the contents of the epithelial cells themselves. When in the course of the affection the deeper layers are also thrown off in patches, the red, angry sub-epithelium is exposed. Whether it is justifiable to call such erosions ulcers, I will not attempt to decide, although the term is applied by many pathologists to any loss of substance upon a free surface occurring from a non-traumatic cause. [2]Schroetter, although he speaks of a loss of epithelium in acute laryngeal catarrh, denies the occurrence of ulceration in this affection. It is certain that ulceration extending through the whole thickness of the mucous membrane, as is the case in tuberculosis, syphilis, etc., never happens in simple catarrhal laryngitis. I expressed this conviction in my first edition, and would draw attention in support of this view—adversely commented upon by more than one reviewer, but which further experience has only strengthened—that

[3] Isambert, [4] Mandl, and many other French writers upon laryngeal diseases are of opinion that ulcerations never occur in the larynx, except in individuals of some specific diathesis (tuberculosis, syphilis, scrofula, etc.). The *fissura mucosa* which [5] Stöerk describes must be a rare phenomenon, since it is not mentioned by any other writer, nor has it ever been witnessed in my own practice. He explains, that should an erosion happen at this point—the inter-arytenoid space—it is quite easy to understand how the break in continuity may extend entirely through the membrane, because just in this place is the membrane often infiltrated and œdematous, and being thrown into folds at each expiration, and immediately afterwards put upon the stretch by the succeeding inspiration, is apt to yield under this alternate stretching and relaxing; moreover, he argues, this region seems to be the *pars minoris resistentiæ* of the larynx, and is a favourite seat of the destructive processes which invade that organ.

In **children** the morbid process is somewhat intensified, the exudation having a greater tendency to be plastic or pseudo-membranous (truly croupous), with a disposition to paresis of the muscular tissues and peri-infiltration of the nerve terminations. Infantile laryngitis is invariably accompanied by considerable spasm and stridor of respiration.

In the laryngitis of **measles**, the hyperæmia occurs in patches of varying intensity, and the epithelium is exuded irregularly; these modifications partaking of the cutaneous characteristics of the primary affection. Erosions are more common than in uncomplicated catarrhal laryngitis, and (rarely) small ulcers are formed. Membranous exudations, wrongly called 'true diphtheria,' occasionally occur in severe cases.

The laryngitis of **variola** is in mild cases of the simple mucous form; but in those of more severe grade very serious laryngeal complications may arise in the shape of pustules, hæmorrhages, abscesses, fibrinous deposit, perichondrial changes, with ulceration and caries. Considering the frequency of so-called diphtheria in the laryngitis of small-pox, it is surprising how rarely witnessed is muscular impairment as a sequel. When such occurs, it is generally permanent, and is far more likely to be due to anchylosis of the crico-arytenoid articulations than to exist as a paralysis of the nature commonly accepted as post-diphtheritic.

Laryngitis in **scarlatina** is rare, and especially so in view of the frequency of pharyngeal complications. The laryngeal inflammation may be of moderate grade and of the simple mucous form, or partake of the pseudo-diphtheritic character manifested

wherever the septic influence of these specific fevers is exerted with malignity. When renal complications arise, the laryngeal condition is often of the nature of acute œdema.

Laryngitis usually occurs as a late manifestation of **typhoid fever**, and more rarely in connection with **typhus**. It may be of the simple mucous variety, or œdematous. The chief characteristic is the strong tendency to active ulcerations, these principally occurring on the epiglottis, though all portions of the larynx may be attacked.

In these diseases also perichondrial changes of the gravest character occur.

Symptoms: A. Functional.—**Voice** is altered at an early stage, and is an almost constant symptom, though the extent to which it is affected varies with the degree of inflammation of the larynx generally, and especially of the vocal cords. The change usually commences with roughness and hoarseness, and a tendency to the production of occasional falsetto and shrill notes as from increased tension. Sometimes, on the other hand, the voice appears abnormally bass in quality. It quickly becomes quite aphonic, and its exercise is in all cases fatiguing, and sometimes painful. The cause of the vocal symptoms first enumerated may be irritation of the superior laryngeal nerve, but the paretic condition of the cords, which is almost always observed in the advanced stages, is no doubt mechanical in its origin, and due to congestion of all the tissues and to inflammation of the articulations; later, possibly to loading of the cords by mucous deposits. In children the vocal symptoms are often not observed until after the occurrence of respiratory evidences.

Laryngeal respiration is unembarrassed in **adult** patients, except in severe cases, and is generally a symptom that the inflammation is extending to the more serious condition of œdema. The character of the dyspnœa of mucous laryngitis is mainly one of spasm, inspiratory prolongation and stridor; these generally decrease as mucous expectoration occurs. In **children** the respiratory symptoms are much more severe, and in some cases are the first evidences of the attack. They present all the spasmodic characters of croup. The paroxysms, as in all croupous attacks, generally occur at night, the child awaking from sleep with violent cough, stridor, and all the other sensations and appearances of suffocation. After a time the spasm subsides, and the little patient falls into an uneasy sleep, to be again awoke after a varying interval by a repetition of these alarming and distressing symptoms. (See 'Croup,' Chapter XVI.) **Nasal respiration** is nearly always interfered with by antecedent or concomitant hyper-

trophic conditions of the turbinated bodies or septum, or by adenoid growths.

Cough is by no means a constant symptom, and is often limited to effort at expulsion of the supposed cause of the uncomfortable sensation of dryness, itching, and irritation of the larynx, which is an early and frequent symptom; when it exists in a more pronounced form it indicates lodgment of secretion at a cough spot, or it may be the result of extension of the inflammation down the pharynx, which gives rise to irritation of the posterior wall of the larynx and trachea. The cough of laryngitis, when severe, is of a characteristic metallic stridulous sound in the earlier stages; while later its tone partakes of the vocal changes peculiar to the case, and may be hoarse, aphonic, high pitched or low. As exudation occurs, the spasmodic character subsides, and the cough becomes loose and moist. Although frequently violent, the cough of laryngitis is not often painful in the **adult**, but it is distressingly so in the case of **children**; the little patient will cry with the pain during an attack, and may be seen to seize his neck as if to prevent it being torn by the violence of the expiratory effort to dislodge the tenacious secretion.

The *expectoration* in **adults** is at first scanty and clear, freer and of mucous character in the early stages of subsidence. Frothy, muco-purulent and abundant expectoration gives evidence that the inflammation is extending to the bronchi. Expectoration in **children** is always scanty, and it is on this account, probably, that the paroxysms of cough are so much more severe and prolonged.

Deglutition, unless the laryngeal attack be complicated with pharyngeal inflammation, is not often affected. In other circumstances there is not unfrequently a distinct uneasiness experienced if food be taken unduly hot in temperature, as it impinges on the epiglottis or against the arytenoids, on entry to the gullet.

Pain is a symptom of very varying intensity in **adults**, but does not always indicate the degree of inflammation. At first the sensation is one of irritation, tickling, or burning within the larynx, soon to be followed by a feeling of tightness and constriction. External tenderness on touch is not, in my experience, a frequent accompaniment of mucous laryngitis. In **children** pain is more constant and more severe.

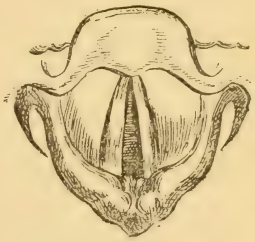
B. Physical Signs are to be observed with the laryngoscope. **Colour** is always increased, as would be expected where there is intense capillary hyperæmia; but the shades of coloration greatly vary, according to the intensity of the attack. The vocal cords are often the last parts to be changed in colour, and may have a normal appearance, with even a high degree of inflammation.

Sometimes, on the other hand, they are, from the first, more or less red, and may become almost purple, and assume a deeper hue than any other part of the larynx. In laryngitis of the exanthemata the characteristics of the cutaneous eruption are often visible in the pharyngo-laryngeal region (Fig. 51, PLATE VI.). **Form** is not often greatly altered in mucous laryngitis, the only parts liable to change by tumefaction being the ventricular bands. These may be swollen to such an extent as to quite obstruct the view of the cords. The epiglottis may lose its sharp outline, but is seldom much thickened in simple laryngitis, except from traumatic causes, when it is often swollen.

Ziemssen has drawn attention to the fact that, independently of the inflammation, the laryngeal image is influenced by the particular character of the muscular paresis. The most usual varieties are those delineated in PLATE X., Figs. 98 and 99; and here reproduced. The first (Fig. CXXIII.) is due to impairment of

CXXIII.

CXXIV.



CXXV.

FIG. CXXIII.—PARALYSIS OF THYRO-ARYTENOIDEI IN LARYNGITIS.
FIG. CXXIV.—PARALYSIS OF ARYTENOIDEUS IN LARYNGITIS.
FIG. CXXV.—IMPERFECT APPROXIMATION OF VOCAL CORDS IN LARYNGITIS, DUE TO SWELLING AND PUCKERING OF INTER-ARYTENOID TISSUE.

the thyro-arytenoidei interni, by which the cords are imperfectly tensed; the second (Fig. CXXIV.) to paralysis of the arytenoideus transversus, which gives rise to a gaping of the cords at their posterior portion. The arytenoid cartilages, and with them the vocal cords, may also be prevented from approximating, especially at their posterior part, by swelling of the mucous membrane of the posterior glottic commissure, as seen in Fig. CXXV.

Surface Texture is, as indicated when discussing the morbid anatomy, liable to be roughened by separation and denudation of the epithelium, leading to erosions; but true ulceration is rare. In the laryngitis of the exanthemata and continued fevers, there are certain surface changes characteristic of the primary affections, and superadded on those due to the inflammation. These have been already described.

Secretion, at first entirely arrested, afterwards becomes excessive in the form of clear effusion of mucine. This, as the case progresses, increases in quantity, and is poured out as mucus or muco-pus.

C. EXTERNAL.—There is tenderness and sometimes even pain on palpation and pressure, but external inflammatory alteration in form or colour is comparatively rare; nor are the neighbouring glands, though sometimes painful, often enlarged.

Where, as in young children, a satisfactory laryngoscopic examination cannot always be made, introduction of the finger into the larynx has been recommended as an aid to diagnosis; but such a course is to be deprecated, and in any circumstance should be employed sparingly. In every instance a laryngoscopic examination should be attempted; and it is surprising how much aid even a very slight view will prove towards forming a correct judgment; especially will it be so where there is the least reason to suspect the presence of false membrane.

General.—An attack of acute laryngitis seldom occurs without premonitory chill, and is almost always ushered in by general febrile symptoms, the pulse being frequent and strong, and the temperature increased. In many cases loss of voice and discomfort are the first indications of an attack.

Commemorative.—There is frequently a decided family predisposition to attacks of catarrh, though the manifestation may not be always laryngeal. The parents of many young patients will often be found, on inquiry, to have themselves suffered in early life. Previous attacks render the patient liable to a recurrence of the malady, the main causes of which liability to repetition have already been discussed.

DIFFERENTIAL DIAGNOSIS.—This is not difficult if the laryngeal mirror be employed; the only diseases that can be compared with acute laryngeal inflammation being laryngismus stridulus and diphtheria. Mistakes in diagnosis are more probable and excusable in the case of children than with adults.

PROGNOSIS, COURSE, AND TERMINATION.—The forecast of an acute catarrhal laryngitis is always favourable so far as life is concerned; but the sudden character of an attack often gives rise to a not unwarrantable fear that the disease may take on a graver character. When an accurate diagnosis is made, and treatment adopted early, the attack is often entirely subdued in four or five to ten days. But too frequently, however, the gravity of the malady is not recognised, and the disease drifts into a subacute stage, and thence becomes chronic. This is especially liable to occur when functional causes are neglected.

A mucous laryngitis may extend to the trachea and bronchi, or it may, under certain conditions, especially when manifested as a secondary complication, take on the more severe form of acute œdema.

TREATMENT: **General.**—In all cases I advise administration of a calomel purge at the commencement; and when the pulse is full I push this drug steadily, both by internal administration in small and frequent doses, combined with James's and Dover's powder, and by inunction with mercurial ointment. In adults, after the purge, aconite in one-drop doses is of great value (Form. 86). Emetics are not recommended, but both in the adult and the child small doses of antimony, with ipecacuanha and saline febrifuges, are of service. When, as the disease advances, secretion is poured out, the process may be favoured by mild expectorants (Form. 89). Ice and ice-drinks are very agreeable to some palates, while in other cases warm emulcents are preferred. But after a clearance of the primæ viæ, internal therapeutic measures resolve themselves into the expectant. The only indication to active medication is the existence and intensity of cough, which should be checked and modified by opiates. These are better administered in very small quantities—℥j. to ℥iij. of solutions of morphia, repeated with frequency—than in larger doses at longer intervals. Opiates to the extent of narcotism should not be given to children.

Locally, everything should be done to change those conditions most favourable to the causation of the disease. For this purpose the room must be kept at an equal temperature of not less than 65° F., be shielded from draughts, and charged with steam. In the case of **children**, steam from a kettle, or a Lee's inhaler (p. 105) playing near to their mouths, or wrung-out hot flannels hung in the same situation, will aid to this end. In the **adult**, the frequent inhalation from an apparatus causing the least effort, of steam combined with volatile ingredients of a soothing or anodyne character, should be constantly employed. Benzoin, chloroform, conium or hop, are the best remedies for this purpose (Form. 29, 30, 34, and 37). Counter-irritation by blisters or blistering fluids, venous depletion by leeches, and the internal application of caustic solutions, are all excluded from my practice. Poultices and compresses are soothing, but are superseded in my more recent practice by the application of continuous cold by means of the Leiter Coil (p. 119). Topical remedies, in the shape of insufflation or solutions to be applied by the surgeon, are seldom necessary, or even advisable. Gottstein, with reason,

makes an exception ' in those cases in which, early in the disease, a paretic condition of the cords exists, and in which the aphonia is out of proportion to the swelling. Here the stimulation produced by the insufflation of a powder composed of equal parts of alum and sugar of milk, or by painting once (with an astringent), is sufficient immediately to remove the aphonia ; there afterwards remains a slight huskiness, due to the injection of the vocal cords, which usually disappears without any further treatment.' Finally, in all cases where there is intra-nasal or naso-pharyngeal disease, these areas must receive appropriate treatment for the reduction of congestion and obstruction—the one by menthol-sprays and ointments, the other by cautery. The rapid cure of many cases of laryngitis by treatment of these conditions alone will be nothing less than a revelation to those who have treated the affection on the old lines.

Dietetic and Hygienic.—There is nothing particular to be said with regard to the dietetic treatment of acute laryngitis. The administration of stimulants *may* be necessary if the strength is failing, but is not often employed in my own practice.

Hygienic treatment during the attack is of the greatest importance, and no chance should be given, by exposure to draughts, for the recurrence of those relapses the liability to which is so great.

For many weeks, indeed, caution must be exercised with reference to night air, heated atmospheres, much use of the voice, and sudden changes in clothing. Seeing how frequently tuberculosis takes its origin from an acute inflammatory attack, as well as from neglect of chronic inflammation, it behoves the practitioner to watch the patient carefully till all functional and physical signs of inflammation have subsided, and not to hesitate, if necessary, to recommend change to a more genial climate.

The prophylactic indications against recurrence are of a totally different nature in the case of patients in whom an attack has been induced either by over-care of themselves or by enforced confinement in an impure atmosphere. In such, gradual education of the body and of the respiratory passages to more vigorous treatment and to a freer indulgence in open-air exercise will be naturally suggested.

In the case of public speakers, clergymen, and singers, complete rest of the voice should be rigorously enjoined until recovery is complete, and permission to resume its use should be withheld until the surgeon has satisfied himself that it is employed in obedience to right physiological principles of production. By observance of this hint, recurrence in the class most liable thereto may more surely be prevented than by any other measure of drug or hygiene.

2. SUBACUTE LARYNGITIS.

In considering the course and progress of acute mucous laryngitis it has been stated that the affection seldom presents symptoms of vital danger; and it has only to be added that there is a form of laryngitis very commonly seen, which is recent in character and presents true evidences of inflammation above and beyond that of mere hyperæmia, but which is, nevertheless, subacute in intensity. There is no necessity to go over the whole ground of the pathology, symptoms and treatment as just detailed, further than to say that while the morbid conditions, functional and physical signs, and therapeutic measures of the graver malady require to be modified in the milder inflammations, the caution must be added that neglect of a subacute catarrh of the larynx may easily lead to a serious inflammation or to its continuation in the chronic form next to be considered.

3. CHRONIC LARYNGITIS.

SYNONYM.—Chronic laryngeal catarrh. (Figs. 50, 52 and 53, PLATE VI.)

Laryngitis chronica, by far the most frequent form of laryngeal disease with which the specialist has to deal, differs widely from the acute inflammation, both in its pathological and clinical aspects. The condition may occur as the sequel of a more serious form of acute inflammation, or it may be exhibited from the first in all the subacute manifestations which characterize it. In such circumstance it is often an extension of a similar variety of pharyngitis. In fact, the two are most frequently found in association, and are often the result of mouth-breathing induced by nasal stenosis. There is, moreover, a form of laryngeal hyperæmia occurring especially in voice-using subjects of catarrhal disposition, which, while not reaching to an inflammatory stage, is so slightly remittent as to be considered essentially chronic. This has been already considered (p. 270).

ETIOLOGY.—The diathetic and atmospheric causes of chronic laryngitis are essentially those producing in some people naso-pharyngeal catarrh, and in others chronic pharyngitis, except that in the laryngeal affection, excessive use of the voice during the catarrhal exacerbations naturally acts more injuriously on the vocal organ. This condition is especially common in those who not only use their voice at all times and seasons, irrespective of their state of health, but who, when they speak, 'do not mind their stops.' It is, therefore, more common in extempore preachers, and still more in those who allow themselves to

become greatly excited, and to violently gesticulate during their harangues. Continued use of the voice in the case of boys during 'cracking' or 'breaking,' is liable to render permanent the inflammation always present during the period of change.

Excessive smoking is undoubtedly an exciting cause of chronic congestion, and is especially so recognised by French laryngologists, who describe at length certain appearances peculiar to 'la gorge des fumeurs.' Increased experience has assured me that use of tobacco has much more obnoxious effect on the larynx than I formerly believed; but I am still of opinion that its ill-effects are, in many cases, confined to the pharynx, where it is particularly harmful to those who while smoking indulge in frequent expectoration. So far as the larynx is concerned, that organ is affected by direct irritation only in as much as it is a portion of the respiratory tract; this is equally true of other impure atmospheres, such as those in which miners, knife-grinders, millers and masons are obliged to work; the effect of these influences on the voice is, as it were, an anatomical coincidence. Occupations which necessitate working in an atmosphere charged with noxious particles are not thought to greatly influence this complaint; they probably predispose to more serious disease.

The habit of taking 'chasses' of cognac, absinthe, and other liqueurs, helps to produce congestion and inflammation of the epiglottis, and this extends into the larynx. Without doubt the victims of chronic alcoholism, especially when spirit-drinkers, suffer very frequently from chronic laryngitis. In both these classes of smokers and topers, the cause of the inflammation is twofold; first, by paralysis of the vaso-motor control, and secondly, in the case of drunkards, as suggested by Gottstein, from accumulation of the profuse mucus—characteristic of alcoholism—which, dropping during sleep from the pharynx into the larynx, sets up irritation in the air-passages. That the power of alcohol to cause chronic laryngitis is due to local as well as to systemic causes, is evidenced by the fact that the same condition may be witnessed in wine-merchants and wine-tasters, who, notwithstanding their occupation, may be very temperate in drinking and careful not to swallow the fluid. Chronic laryngitis is not infrequently witnessed as a sequel of measles and other exanthemata, even in cases in which acute laryngeal inflammation may not have been manifested.

The presence of morbid growths is also asserted to be a cause of this condition, but it might more properly be classed as an effect.

When, however, enlarged bronchial glands or other tumours press upon the recurrent nerve, even to a slight extent, there is

frequently laryngeal hyperæmia. It is a question whether this be not due to irritation of the sympathetic interfering with the vaso-motor supply. Patients of the arthritic diathesis, and also those liable to hæmorrhoids, and other affections due to congestion of the portal system, frequently suffer from catarrhal laryngitis.

It is a moot-point as to how far an elongated uvula is responsible as a factor in the production of chronic laryngeal inflammation, but it is suggested that the two conditions may be simultaneously or successively produced by one exciting cause, which is usually hypertrophic nasal catarrh. There can be no doubt that chronicity of laryngeal inflammation is sometimes due to uvular irritation.

The disease is essentially one of adult life, and is naturally, having regard to the circumstances favourable to its causation, more frequent in males than in females.

PATHOLOGY.—This affection is marked by a permanent dilatation of the vessels, due to a long-standing hyperæmia, and a hypertrophy of the mucous membrane in all its layers, and to a change in mucous secretion. [6]Tobold reports a case in which the hypertrophy of the ventricular bands was so great as to obliterate the pouches of Morgagni, and to conceal entirely from view the true cords. Such a grade of thickening is, however, comparatively rare, and seldom occurs in simple catarrh. In chronic blennorrhœa and the throat affections of typhoid patients the mucous membrane is sometimes seen to be thrown into such thick, heavy folds as to render the larynx almost unrecognisable. [7]Lewin states that such a condition is not unusual in the chronic sore throat of preachers and criers. The glands and glandules especially partake of the general hypertrophy, and give to the membrane a granular appearance—*laryngitis granulosa*, otherwise called *follicular laryngitis*.

[8]Türck first described and figured a peculiar form of chronic inflammation limited to the vocal cords, which he often observed in professional singers, and to which he has given the name *Chorditis tuberosa*. A number of such cases have occurred in my practice in which the appearances agreed exactly with the description given by this author. Whilst the other regions of the larynx seem quite normal, the cords are of a yellowish-red colour, and upon their superior surface, usually near the free margin, appear little white tumours or granulations varying from the size of a millet-seed to that of a small pea. According to the experience of [9]Mandl, in chronic laryngitis the inflammation is commonly seen to be confined to the arytenoids and vocal cords in singers and orators, and to the epiglottis and ary-epiglottic folds in drinkers and smokers, an experience with the first portion of which I entirely agree. In

advanced cases of alcoholic laryngitis, if the term may be used, the hyperæmia and thickening are general.

Erosions, chiefly upon the cords and between the arytenoids, are much more frequently met with in chronic than in acute catarrh. Such loss of epithelium is not readily noticed by other than the experienced laryngoscopist, who recognises this condition not so much by the change in colour as by the absence of that peculiar sheen which the epithelium, covered with mucus, lends to these parts in the normal larynx. Catarrhal erosions heal readily by quick regeneration of epithelial cells, and the loss of substance never extends beyond the uppermost layer of the mucous membrane, being usually small in extent and circular in shape.

Symptoms: A. Functional.—The **Voice** is, as a rule, chronically hoarse; the amount of dysphonia, however, varies considerably, according to the degree of inflammation of the cords, and also after functional rest or exertion: under injurious influences it may become aphonic. Food-taking will often improve it; and another factor of variation of functional purity is the time of the day. Thus a patient will arise with the throat dry and with distinct hoarseness. After breakfast the voice may be comparatively clear, to become again quite hoarse after some hours of use, or as the effect of bodily fatigue. If the patient sings, the vocal injury will be manifested in loss of range, diminished endurance, and want of control. As the disease advances, all vocal efforts will be obviously strained and laboured.

Respiration is seldom embarrassed, but the respiratory act becomes less complete, so to speak, on account of the fatigue of the glottis. In the act of phonation, therefore, the vocal cords are not set in action by full bellows-power, and breath-taking during speech becomes frequent and gaspy. **Nasal respiration** is usually impeded.

Cough is a frequent but by no means constant symptom, unless the catarrh has extended to the trachea and bronchi. It most often occurs on rising in the morning, on change of atmosphere, on use of the voice, or under any circumstances liable to facilitate the dislodgment of mucus in the air-passages. The cough, also, is of two kinds, one a moist cough, when the mucus is excessive, but not deficient in fluid qualities; the other ringing and metallic, to be noticed in advanced cases in which, the secretion having become dried and tenacious, has rendered the cords harsh, and has crippled muscular and articular movements.

Pain.—Except in the effort of vocal exertion or after fatigue, there is rarely true pain. There is, however, a constant feeling of constriction, or as if there were a foreign body in the air-

passages. When the uvula is elongated, direct irritation may play some part in giving rise to this sensation.

B. PHYSICAL.—**Colour.**—The hyperæmia of chronic laryngitis is by no means uniform. The congestion of the vocal cords may be unilateral, or may be limited to the cartilaginous portion. In the latter case the vocal process will be seen to stand out as a white prominence: the other parts of the larynx are congested in proportion and frequency to the closeness of adhesion of the mucous membrane to the subjacent tissue; viz., the epiglottis, the cartilages of Wrisberg and of Santorini, and the ventricular bands; and they are usually affected in the order named.

The capillary vessels of the epiglottis are often seen to be in a state of varicose congestion, similar to that in chronic pharyngitis. A case in which there was a similar condition of the vocal cords and ventricular bands has been described by [10]Morell-Mackenzie, and has been termed by him *Phlebectasis laryngea*. It is exceedingly rare, and hardly merits the dignity of being considered as a separate disease or variety. In this opinion I am supported by Von Ziemssen, [11]Duchek, [12]Duncan Gibb, Gottstein, and most other authorities.

Form and Texture.—Although there may be swelling of the mucous membrane, especially of the looser portions, absence of submucous thickening is a marked characteristic of chronic catarrhal laryngitis, to which may be added immunity from ulceration. The epiglottis is the only part likely to be at all thickened, this especially in the laryngitis of alcoholism.

There is commonly relaxation of the inter-arytenoid fold and of the ventricular bands, and the vocal cords are often seen during phonation to have lost co-ordinative power, and to be spasmodic in action, giving a jerkiness of movement.

Very rarely indeed there may be slight erosion at the vocal process (Fig. 52); *i.e.* at the situation where friction may be exercised; but such a symptom should be looked on with the greatest suspicion of deeper mischief. Another situation for erosions is the inter-arytenoid fold. The follicles of the larynx are sometimes enlarged and prominent (Fig. 53). Some writers then consider the disease as a separate variety, viz., follicular laryngitis, or glandular laryngitis.

My opinion on this point is the same as that enunciated concerning varieties of chronic pharyngitis, viz., that all, being due to one pathological cause, should be considered as variations in degree, and not of kind; but when there is any distinct enlargement of the racemose glands, and especially if there be superadded erosion, however slight, of the vocal cords, the practitioner should

search carefully for signs of general phthisis. Comparison of Fig. 53 in PLATE VI., and of Fig. 72 in PLATE VIII., will show how enlargement of the glandules may be but a first step towards tuberculous ulceration. I entirely agree with Gottstein, who says that it is doubtful whether the small red points sometimes seen on the vocal cords in chronic catarrh bear any analogy to glandular pharyngitis, and for one reason, because, as is well known, such glands are entirely absent from the upper surface of the cords. This author's suggestion that these red points are to be considered as papillary enlargements, which, under certain circumstances, are the origin of polypi, is also one of great probability.

Mobility is often impaired, both from mechanical obstruction to articular action and by slight muscular pain.

The changes in this direction are usually, but not uniformly, bi-lateral.

Secretion.—This may be abundant or sparse; it is almost always excessive in the earlier stages, but often becomes gradually arrested as the disease advances; so that the throat is felt and seen to be always dry. The character of the secretion generally is that of a gelatinous accumulation, with viscid, tenacious mucus clinging about and around the laryngeal orifice, and collecting in thick pellets upon the cords and in the ventricles.

The little bridges of mucus stretching from cord to cord, which are seen during phonation, are almost in themselves sufficient to differentiate a chronic from an acute catarrh.

C. MISCELLANEOUS.—External examination gives but negative results, though the surgeon's attention is often drawn by the patient to a supposed swelling. When any glandular enlargement is present, there is strong reason to doubt the simple nature of the complaint. The general health suffers in very varying degree; this variation depending much upon the importance of the loss of voice to the material well-being of the patient, and its consequent effect on his nervous system.

The digestive system is frequently disturbed, causing loss of appetite and dyspepsia. Worry and mental anxiety will often produce sleeplessness, and even emaciation. Careful examination of the lungs should never be omitted in any case of chronic laryngitis, especially when there is persistent swelling of any part of the mucous lining, or when there is ulceration.

PROGNOSIS, COURSE, AND TERMINATION.—Recovery from this disease is always slow, and greatly depends upon the amount of obedience to the practitioner's directions, and the perseverance with which they are carried out.

The great cause of anxiety is the fear of a simple catarrh

running into the tubercular form. On this account the prognosis should be guarded, especially if there be the slightest tendency to phthisis in the patient's family. As a rule, with persistence of treatment. these cases do well. When, however, the catarrhal predisposition is strongly marked, the tendency to relapse is great. This cause will be found to exert an influence on associated enlargement of the cervical or bronchial glands. In cases of goitre there will often be a marked exacerbation on the recurrence of the menstrual flow.

In many instances, however, the baneful cause will have produced so much mischief, that the voice will, in spite of all treatment, remain hoarse. This is the case when the disease is due to chronic alcoholism, and where abuse of the voice has been very exaggerated. Vocalists, if they regain their voice, but too frequently find that the range is diminished, and the tone-quality impaired.

TREATMENT: **General.**—Constitutional remedies are not of much service, though attention to the digestion, diet, and general powers of the patient is of decided importance.

In many cases where the mental anxiety has almost gone the length of hypochondriasis, bromide of potassium has proved of great utility in my practice. In other cases 5-grain doses of hydrate of chloral two or three times a day have an admirable effect in calming the mind. When there is portal congestion, a natural saline purgative draught each morning is beneficial. In glandular enlargements and goitre, iodide of iron and other suitable remedies must be given, and cod-liver oil will also be indicated where there is any sign of general emaciation.

Local.—Local measures must be directed to favouring resolution. First amongst these are vapour inhalations of a stimulating character. Benzoin with pine oil, benzole, creasote, and pine oil, or pine oil with camphor, are the best; the first being the mildest, the others successively stronger in stimulant action (Form. 31, 32, 35, 39, and 40). This list of stimulating inhalations is quite long enough for all practical uses. Obstructions in the nose, so frequently present, are to be radically removed; for mere palliation will not lead to complete cure or protect against recurrence.

Lozenges, whether the pharynx be or be not affected, are also of great benefit, those in Form. 12, 16, and 17 containing astringents, together with sialagogues and expectorants, being the best adapted to fulfil the various indications. When pharyngeal disease coexists, the treatment of such a condition is considered of primary importance, and very many cases of laryngeal congestion will get quite well with but little further treatment when the co-existent disease higher up has been cured.

The use of local astringent solutions is of decided value, especially when there is congestion of the vocal cords, arytenoid cartilages, or inter-arytenoid folds. Such solutions should be of very moderate strength: the most generally serviceable is that of chloride of zinc, 10 to 30 grains to the ounce of water, and the application must, of course, be made by the surgeon himself, with the aid of the laryngeal mirror (Form. 65).

It is worse than useless to allow such a measure to be attempted by any lay friends or relations of the patient.

Von Ziemssen advises the use of the solid nitrate of silver (!!), and of solutions of that salt to the strength of 240 grains (!) to the ounce of water. In no case of congestion is even a mild solution of the silver salt superior to one of zinc, aluminium, or iron (Form. 65, 59*, and 62); and the spasm exceptionally characteristic as a result of lunar caustic applications, is highly detrimental in a disease where rest to the organ is an all-important factor in treatment.

Beyond these objections, I have long believed that applications of nitrate of silver to inflamed surfaces have the effect of inducing hyperplasia; so much so, that whenever I have found in cutting a tonsil that the tissue was unusually dense and gristly, I have suspected a long course of such treatment, and on inquiry my suspicions have generally been confirmed. My colleague, Dr. Orwin, reports to me a case strongly supporting this view in regard to their influence on the larynx, which he recently saw in Buda-Pesth, under the care of Dr. Irsai:

It was that of a male patient, aged 40, who had long suffered from chronic laryngitis, which, during the last three years, had been treated by means of spray applications to the larynx of a 10 per cent. solution of nitrate of silver, with the result that not only had his whole body, especially his face and hands, undergone characteristic discoloration, but thickening of the entire larynx had taken place to such an extent as to cause dangerous stenosis. For this condition Dr. Irsai had been compelled to perform tracheotomy, and had subsequently widened the glottic opening by means of Schroetter's dilators.

Application by the brush is preferred in our practice to the use of insufflations or of sprays, though all three methods are employed according to indications. Mineral astringents are greatly to be preferred to the weaker vegetable solutions of the same character.

As the congestion subsides, faradization is of great benefit in restoring tone and co-ordinative power.

Externally the application of wet compresses, and the nightly painting with tincture of iodine over the thyroid cartilage, will be found of value.

Hygienic and Dietetic.—Of primary importance is a careful avoidance of all preventible causes of the affection. First and foremost may be mentioned rest to the voice, not only from professional exertion, but in ordinary conversation. In the home circle the patient should be directed to speak always below his breath, even to a whisper; to avoid irregular vocal efforts, as laughing; and, especially, never to speak in noisy streets or vehicles.

Lessons in elocution with reference to breath-taking are also all-important. The patient when recovered should be directed to take a full inspiration, to commence to ex-spire only with a spoken word, and to utter at first only one word with each expiratory effort. Gradually he may be allowed to say two or three words on each breath, and so to lengthen his sentences to the ordinary extent. In these lessons nothing is better than the Prayer-book version of the Psalms, pointed as each verse is into four sentences for chanting. These sentences can easily be subdivided and lengthened for the necessary lessons.

All noxious habits of smoking and drinking, exposure to varying temperature, and the continuance of hurtful occupations, are to be interdicted. For those whose occupations compel them to be more or less exposed to cold or damp atmospheres, the use of the respirator, or one of its efficient substitutes, will be necessary, and will often be found a great help to treatment.

Cold affusions and general tonic measures are useful to many, while in others climatic change to warmer countries will be imperative.

The Turkish bath, from its action on the skin as well as for the local benefit of the inspired hot, dry air, is often of the greatest value in chronic laryngeal inflammation.

The diet must be simple, nutritious, and non-irritant. As a tonic, a fairly generous Burgundy will be found to be more easily digested and more nourishing in its quality than the port of the preceding generation or the claret of the present day.

Laryngitis Sicca.—In advanced cases of atrophic rhinitis and pharyngitis sicca, and very rarely without such an association, catarrh of the larynx results in an exhaustion of the fluid elements of the mucous secretion. The consequence is that the scales and strings of dry, discoloured mucus are seen to cling to the membrane, itself generally dry and highly inflamed. Efforts to dislodge the adherent mucus is often attended by slight hæmorrhages, but with temporary improvement to the voice, which is otherwise almost or entirely lost.

I have seen this disorder in coal-heavers, sweeps, etc., and have often observed that atoms of the impure atmosphere attendant on their calling are to be seen in the larynx. It is probable that when associated with atrophic rhinitis, the far larger nasal space occasioned by the latter disease favours inspiration of the atmosphere unfiltered and unmoistened, and thus directly leads to inspissation of the laryngeal secretion.

TREATMENT consists in liquefying emollient sprays (Form. 42, 45, 49, and 51) and moderately stimulating inhalations (Form. 31, 32, and 39), to which in these cases addition of aldehyde is especially serviceable (Form. 33). Concurrent treatment of the nasal and pharyngeal condition is also of importance, and inunction of the nostril is of distinct value as a means of catching noxious particles of the atmosphere from falling into the larynx (Form. 82 and 84).

Sub-glottic Chronic Laryngitis represents a peculiar form of chronic laryngeal catarrh, to which attention was drawn by such early observers as [13]Czermak and [14]Türck, and of which cases have also been reported by [15]Burow, [16]Gehrardt, and others. The last-named author has given it the name of *Chorditis inferior hypertrophica*, because in the course of the disease hyperplasiæ in large groups form in the inferior cavum of the larynx, which may produce a serious degree of stenosis. The *Chronic blennorrhœa* of Stöerk, to which allusion has been made in relation to its pharyngeal manifestation (page 184), gives rise to a similar appearance when it extends to the larynx, but is never manifested in this region as a primary disease of that nature. According to [17]Klebs the cicatricial formations upon the cords in blennorrhœa are, in their histological elements, very like those of rhinoscleroma. I have seen but one case of laryngeal rhinoscleroma, and in this, the clinical signs and the laryngoscopic appearance were so like those of chorditis inferior hypertrophica, that I believe the diagnosis would have been impossible but for the simultaneous existence of the growth in the anterior nares.

The FUNCTIONAL SYMPTOMS are in the main vocal and respiratory, and may extend, the one to aphonia, the other to suffocative attacks of dyspnœa. The PHYSICAL SIGNS are, as hinted, difficult of exact diagnosis, mainly because it is not always easy to ascertain of what nature is the thickening.

TREATMENT consists in dilatation either prior or subsequent to the performance of tracheotomy. The best modes of dilating will be more fully described in the chapter on 'Syphilitic Laryn-

gitis,' in which stenosis, calling for surgical interference, is a much more frequent complication than of a simple laryngeal catarrh.

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CHAPTER XIV.

INFLAMMATION OF THE SUBMUCOUS TISSUE OF THE LARYNX.

1.—ACUTE.

SYNONYMS.—Œdematous laryngitis; Phlegmonous laryngitis; Acute œdema of the larynx; Œdema of the glottis.

Serous infiltration of the submucous tissue is one of the gravest manifestations of acute catarrhal or specific inflammation, and will immediately receive consideration.

The condition may, however, arise as a simple œdema, quite independently of any inflammatory process, and especially as a manifestation of hepatic obstruction, malaria, and of general dropsy, caused by disease of kidneys, heart, or lungs, or, according to [1]Von Ziemssen, 'as a result of circumscribed obstruction in the laryngeal veins, through compression of the superior and inferior thyroid veins, or, further, of the facial vein, or even of the internal jugular, and the innominate veins. The œdema will be unilateral or bilateral, according to the site and extent of the hindrance to the circulation. Such compression may be produced by enlargement of the thyroid glands, swelling of the lymphatic and salivary glands, and new formations about the neck, aneurisms of the aorta, etc.' It is unnecessary to further allude to these lesions than to say that relief of the local condition is only of temporary benefit, unless attention be mainly given to the removal and alleviation of the primary cause.

Acute Œdema of the Larynx, as a complication or phase of laryngitis, is a tolerably rare affection. When occurring it constitutes a very grave condition, on account of the extremely important influence that but comparatively slight œdema may exercise on performance of the vital process of respiration. It is probable, as already hinted, that the effusion in adults has its analogue in children as a non-specific membranous laryngitis or true croup; the difference between the submucous serous infiltration of the one and the membranous transudation in the other being

explained by the imperfect capillary system of children. Acute œdema of the larynx is seldom witnessed prior to the age of adolescence.

[2]Gottstein considers *acute submucous laryngitis* and *acute serous infiltration of the submucous tissue of the larynx*—to which last only he gives the name of *acute œdema*—as two separate diseases; but there does not appear sufficient ground, either clinical or pathological, for this distinction.

Etiology.—Excluding cases resulting from traumatic causes, œdema is much oftener a secondary than a primary affection. Among 6,062 post-mortem examinations made at the Berlin Charité between the years 1869-71, [3]Hoffmann found 33 cases of œdema glottidis, 10 of which were of primary and 23 of secondary origin. [4]Sestier found in 190 cases, 36 primary and 122 secondary. Among the general diseases which may give rise to œdema glottidis, various forms of cardiac disease, nephritis, and phthisis are the most frequent causes. Gottstein expresses a doubt as to whether serous infiltration of the larynx ever occurs as a primary affection, considering that 'in the great bulk of cases it is a sequel of local diseases.' That acute laryngeal œdema is often preceded by pharyngitis is true, but not more so of it than of a simple catarrhal laryngitis. It is equally a fact that it is exhibited as a direct complication of more specific forms of inflammation of the larynx, as of syphilis and tuberculosis, of perichondritis, and of retro-pharyngeal abscess. It is, moreover, frequently associated with acute infectious diseases, and especially with erysipelas and pyæmia. I have experience of one case in which it occurred as a sequel to uræmic poison in connection with an enlarged prostate. But this only goes to prove that any condition likely to poison the blood-supply is favourable to the serous infiltration, and there are ample anatomical causes to explain the preference for infiltration in the upper air-passages.

It cannot be denied that acute œdematous laryngitis frequently occurs as an apparently primary affection. Of *predisposing* causes a previously low state of the general health or great bodily fatigue is almost invariably to be observed; for there is almost always a history of long hours of toil, exposure, or travelling. The *exciting* cause may be induced in many ways. The patient sits in a draught of cold air, or drives or rides exposed to the bitter keenness of a north-east wind. Probability as to the existence of a variety of the atmospheric factor in the production of a catarrhal or an œdematous laryngitis has been already alluded to, and the following case is illustrative of this suggestion. It has many other

points of extreme interest which will receive attention in other places more appropriate to their consideration (see page 311).

F. B., æt 12, was brought to me from Arundel by Mr. Evershed of that town. The history was that having become very hot through labour in the havfield he lay down to sleep in the open air, exposed to a hot sun simultaneously with an east wind. On awaking he felt pain and stiffness in the neck, which was followed by acute inflammation of the right side of the neck and larynx. Acute œdema with great stridor followed, and when I saw him at the end of three months, the larynx was found to be still generally inflamed, with considerable infiltration both supra- and infra-glottic. The right vocal cord was also at that time immobile. The diagnosis was acute perichondritis, with simultaneous submucous laryngitis.

In some cases there is no premonition whatever of inflammation, and distress due to infiltration is the first symptom manifested. Cases have positively been reported in which death occurred without any threatening of the condition which, on autopsy, was proved to be the cause of death. Probably in such circumstances there exist also an unrecognised organic disorder of the circulation.

Of others less rapidly fatal, but almost equally sudden in appearance, the following are examples:

1. A man after a day's work in a blast-furnace, walks in the snow, and sits for hours in his damp clothes smoking and drinking in a badly-ventilated, low-pitched taproom, which he leaves at a late hour, again exposed to the open air, for a small room in a close quarter of the town.

2. A cabman takes frequent nips of raw spirit in a hot bar, to 'keep out the cold' to which he is exposed for the rest of the night on his box.

3. Lastly, a young man, tired with office-work during the day, spends his evenings practising glees at a smoking concert: he takes, on leaving, nothing more than a little cold whisky-and-water, but goes home thoroughly tired to bed.

In each of these instances—all taken from actual experience—the result is the same; the patient awakes from sleep, a few hours after retiring to bed, with a feeling of great discomfort in respiration, which speedily increases to a sense of intense suffocation. And, not to anticipate, all the symptoms of œdema, to be presently detailed, are developed with alarming rapidity, and with but little preliminary warning.

Lastly, traumatic causes may produce acute œdema; such as swallowing hot water—Cohen mentions, also, extremely cold water—or inhaling scorching hot air, irritant poisons, caustic applications, and, occasionally, injury produced by the introduction of intra-laryngeal instruments for operative purposes. In these last cases the effusion is often purely hæmorrhagic; in others it is sero-sanguineous in character.

Œdema of the larynx, especially when of traumatic origin, may develop very rapidly. I remember one case in which the left ary-

tenoid had been wounded by a small fish-bone, and in which laryngotomy had to be done three hours after the accident. On another occasion, in which the œdema was the result of an intralaryngeal operation, I had to operate within an hour of its origin.

PATHOLOGY.—Œdema of the larynx consists essentially of transudation or infiltration, usually serous or sero-purulent and sometimes sanguineous, into the submucosa. We have noticed in Chapter VIII., page 167, that such infiltration and its resultant signs are modified in the various districts of the larynx by anatomical differences in the thickness and tension of the mucous membrane and submucosa; it has also been pointed out that the ary-epiglottic folds, the ventricular bands, and the ventricles are those structures which offer least resistance to infiltration.

The commencement of the process is marked by a slight reddening of the mucous membrane with increased secretion, especially in the neighbourhood of the ventricles, which are rich in muciparous glands. The parts affected soon become swollen and œdematous, and the membrane grows pale and assumes a stretched appearance. When the ary-epiglottic folds become infiltrated they grow into large yellowish-red tumours, obliterating the ventricles, completely cover the cords and often produce stenosis in an extreme degree. Sometimes both, but oftener only one of the arytenoids takes part in the inflammation and infiltration, and may swell to twice or even three times its normal dimensions; and it is in such cases that the rapidly rising dyspnœa develops. When the epiglottis becomes œdematous it appears as a large round translucent tumour, and may attain such dimensions as to completely block up the entrance to the larynx.

The epiglottis is especially attacked in those cases in which the laryngeal inflammation follows on a pharyngitis. In œdema associated with the specific poisons of scarlet fever, erysipelas, typhus, and small-pox, the infiltration may extend to the muscles and other tissues of the neck. In such cases both the primary and secondary affections are of the most virulent form. They partake of the nature of phlegmonous inflammations. False membrane is often formed, and the disease then assumes a pseudo-diphtheritic character. The inflammation may be followed by ulceration, and may extend to the perichondrium, terminating in caries or in gangrene. The appearances of an œdema of the larynx in life, and after death, are altogether different, but each is characteristic; the shrunken, wrinkled membrane seen on autopsy, and resembling the hand of a

washerwoman after long soaking in the wash-tub, will clearly indicate the prior existence of swelling due to effusion even where no laryngoscopic examination was made in life.

The microscopical characters are such as would be naturally expected from knowledge of the morbid process. There is an effusion of serum, with, in most cases, an escape of leucocytes into the meshes of the connective-tissue of the submucosa. On supervention of inflammation white corpuscles migrate from the vessels in great excess, and, undergoing fatty degeneration, are converted into pus-cells.

Œdema is not always limited to the supra-glottic region, but may extend to infiltration of the submucosa beneath the vocal cords (PLATE VI., Fig. 47). Infra-glottic œdema, as it is then called, is almost invariably secondary, and it is always serious; the effusion is slow in subsiding, and has a strong tendency to pass into the subacute or chronic stage. We have alluded at page 296 to that peculiar form of chronic inflammation which has received the name of *chorditis inferior hypertrophica;* in point of fact, it would more properly be considered as a submucous inflammation, and was only mentioned in that situation because it is usually so discussed by other authors. The diagnosis of the exact character of sub-glottic infiltrations is really very difficult, and practically of not much influence in the prognosis. In some instances the effusion is circumscribed; this condition indicates the probable formation of an abscess.

SYMPTOMS: A. FUNCTIONAL.—There is no occasion to discuss in detail all the various changes in the performance of normal acts, many of them being similar to those observed in the catarrhal form of inflammation. It is to be remembered, also, that in describing the various symptoms of a typical inflammatory œdema, many cases occur in which there are no symptoms whatever prior to that of a fatal suffocation or syncope.

The **voice** is naturally affected, and is usually rough and deep, or altogether lost, the alteration being due to thickening and weighting of the cords, and to mechanical impairment of normal muscular contractions.

The **respiration**, as it is the most important function that is affected by œdema, is also that which, as a rule, most prominently attracts attention, and calls urgently for relief, though cases occasionally occur, especially in the course of chronic diseases of the kidneys and other distant organs, in which considerable œdema exists, without respiratory disturbance. A slight exciting cause will, in such circumstances, produce a fatal suffocation; as, for

instance, in the patient reported by Ziemssen, and quoted by [5]Cohen:

> The man died within a few minutes of entering the Clinic at Greifswalde, from penetration of the wall of the right ventricle of Morgagni by a sharp piece of the rib of a tobacco-leaf. The patient, who had come there on account of Bright's disease, was sitting in a waggon smoking when he arrived.

The chief difficulty in breathing in the early stages is in the act of inspiration, which is quickly observed to be stridulous, but in many cases expiration is at first unaltered. The dyspnœa is due to stenosis caused by œdema of the ventricular bands, or of the submucous covering of the arytenoid cartilages. In rare cases the symptoms may be due to a similar condition of the infra-glottic mucous membrane. As the disease advances expiratory distress takes place, with the result of inducing complete apnœa.

Cough is observed in the acute inflammatory form, but is short, incomplete, and unproductive. It is due to an endeavour to remove mechanical impediment to respiration rather than to a desire to dislodge secretion. Occasionally the cough is spasmodic, resembling in the adult what is observed in the child during an attack of croup. The act of coughing is frequently very painful.

Deglutition is both difficult and painful, not only when the epiglottis is involved, but also when the coverings of the arytenoid cartilages are infiltrated, the swelling then implicating the anterior wall of the pharynx at its entrance to the œsophagus.

Pain is a distinct but by no means constant symptom. When the infiltration extends to the adjacent tissues of the neck, distress on movement is naturally increased. When œdema is considerable, the sense of suffocation is most oppressive. Pain on palpation depends somewhat on the mechanical rigidity and tension of the tissues involved.

B. Physical.—With the laryngeal mirror œdema is quickly recognised. When associated with acute inflammation, the colour is very characteristic, the infiltrated portion presenting the appearance of a globular semi-transparent body, very bright in tint at the circumference. At other parts numerous highly-injected capillary vessels will be observed, especially on the epiglottis. In the œdema associated with disease of liver, kidneys, or heart, the coloration is less intense; it is increased when the inflammation is secondary to acute infectious disorders. The vocal cords are invariably of a deep red hue in inflammatory œdema, and when the effusion is subglottic, the mucous membrane in that situation will almost always be seen to be of a more intense red than the cords above. Acute œdema of the vocal cords is an extremely

rare occurrence. In cases of hæmorrhagic effusion, the swelling is localized, and is of a deep red, the rest of the larynx being entirely or comparatively normal in form and hue. The fact of an abscess may be suspected when a circumscribed soft red swelling, less translucent than when the effusion is serous, is observed. I have never seen the yellow coloration insisted on by some authors as characteristic of the presence of pus.

Form and texture may be greatly altered by œdema, which, as before stated, may be general or partial. Reference to the plates will indicate the great changes which may occur in configuration.

The special changes characteristic of laryngitis associated with the exanthemata, which may be either mucous or submucous, have already been detailed at page 279 *et seq.*

In scarlet-fever the colour will be modified in patches of varying intensity; in erysipelas there will be the peculiar brawny character; in typhus the mucous membrane will be dusky; in small-pox, pustules will be visible: all these distinctive changes are for the most part to be seen on the epiglottis. When the inflammation is due to the swallowing of boiling water, the epiglottis is more frequently œdematous, and (especially in young children) the whole surface may be covered by a false membrane, which differs from that of croup or diphtheria in its greater transparency and diminished tenacity. Irritant poisons often produce excoriations and ulcerations, their gravity and extent, as also the œdema, depending on the virulence and extent of the noxious influence. When there is injury from a foreign body (Fig. 54, PLATE VI.), a portion of the mucous membrane may be seen to have been denuded, and inflammation will have commenced at the seat of injury.

Alteration of **secretion** is manifested in the form of serous effusion into the submucous tissue, which may become sero-purulent or purulent: this, as recovery takes place, is expelled as a copious mucous or muco-purulent discharge, with, possibly, sanguineous staining.

C. MISCELLANEOUS.—These greatly vary according to the primary cause of the œdema, and have been already to a considerable degree indicated. There may be fever, with all its accompanying changes of pulse and temperature; or, as in sudden œdema in connection with chronic diseases, there may be no special symptoms calling for attention. When once the œdema is manifested, the general effect on the health is one of extreme depression of the system. In all there are more or less prolonged periods of repose, and almost always there is an

exacerbation of every symptom, subjective and objective, in the night hours.

Diagnosis.—There is no probability of the laryngoscopist mistaking œdema for any other laryngeal condition. The only caution to be observed is not to neglect to seek for the primary cause, evidence of which may be hidden or masked by the local changes due to the infiltration.

Prognosis, Course, and Termination.—Recovery from acute œdema of the larynx of primary origin is always doubtful, and will be influenced largely by the stage at which it comes under treatment, and the amount of success attending local remedial measures correctly and vigorously adopted—that is to say, on the promptitude with which relief is afforded to the mechanical obstruction to healthy respiration. The forecast of a secondary œdema must be regulated by the circumstances attending the primary cause of the disease. The duration of an attack—*i.e.*, the anxious period—may not last above three or four days; but the patient can hardly be said to be out of danger under two or three weeks, and may even then be the subject of chronic infiltration. Complications may arise, as has been suggested, in the lungs, or by the supervention of a croup or pseudo-diphtheria on a simple inflammation, with the further result of ulceration or gangrene. When death occurs, it is most frequently due to carbonic acid poisoning, but may be the direct result of stenosis or spasm of the glottis. Both the symptoms and the prognosis are much more serious when the inflammatory process and infiltration has extended to the tissues beneath the glottis. Another source of danger is the possible advent of suppuration—abscess of the larynx—to which allusion has already been made.

Treatment: **General.**—In mild cases treatment should be commenced on the lines indicated for mucous laryngitis, the remedies being modified in the secondary forms in accordance with the primary cause.

Beyond the promotion of diaphoresis and diuresis by mild salines, I do not prescribe general drug treatment; but the cough often demands relief by sedatives. Iron is indicated as a tonic of specific value in many of the secondary forms. Since the introduction of pilocarpine, I have found benefit follow its hypodermic administration in doses of from $\frac{1}{12}$ to $\frac{1}{4}$ of a grain.

Regulation of the temperature of the room, and the use of inhalations, will be of service in a submucous as in a mucous laryngitis, while the effect of applications of continuous cold by the Leiter coil is even more markedly beneficial in the œdematous than in the catarrhal from of inflammation.

So soon as and wherever œdema is discovered, local scarification with the laryngeal lancet should be employed. There is probably no such severe disease that can be so quickly relieved by a simple local measure as can œdema of the larynx, and the operation is one of really easy performance to a practitioner having but moderate skill in the use of the laryngoscope. The relief to the local distress and the consequent general comfort of the patient is sometimes little less than magical.

There may be recurrence of the œdema after scarification, but the tendency thereto is diminished by employment of pilocarpine and perseverance in use of the cold coil. If, in spite of scarification and the other means recommended, œdema continues, with consequent increase of respiratory distress, general enfeeblement and symptoms of blood-poisoning, tracheotomy must be performed. When the disease is due to traumatic causes, this procedure may be necessary at a quite early period, but in uncomplicated attacks it is always better to give medicinal, surgical, and hygienic remedies a chance. Even when death has taken place as it may do most suddenly, the windpipe should be opened, and artificial respiration tried.

Bearing in mind the liability to infra-glottic œdema, we should open the trachea as low down as possible. There is the possibility, in this form, of the knife pushing the swollen mucous membrane before it, instead of dividing it, so that the trachea tube passes between the mucous membrane and submucous wall. This is a serious accident which has happened to good surgeons; it will be best guarded against by taking up the trachea with a firm tenaculum before making an opening into it. Even after the swelling due to œdema has been reduced, tracheotomy may become necessary on account of paralysis of the crico-arytenoidei postici from serous infiltration.

In the case of abscess, incision must be made by means of a guarded laryngeal knife. The head of the patient should after the incision be quickly lowered to prevent, as far as possible, the passage downwards of the escaping fluid. If pus is liberated, it is quite possible that there will be a temporary exacerbation of the dyspnœa and cough, to be followed in a few moments by great relief.

2. CHRONIC SUBMUCOUS INFLAMMATION OF THE LARYNX.

Synonym.—Chronic œdema of the larynx.

Chronic serous infiltration of the laryngeal submucosa may remain after subsidence of an acute attack, or it may complicate

some of the subacute specific diseases of the larynx, as caries—the result of perichondritis, however caused, and of syphilis and cancer; but in my experience true laryngeal œdema is seldom witnessed in connection with tuberculosis. In its chronic form œdema is more frequently unilateral than in the acute; and infra-glottic œdema is almost always subacute in intensity, and is very slow to subside. Chronic serous infiltration of the larynx often exists as such from the first, when occurring in connection with the diseases of circulation and excretion already mentioned in our description of the acute form; and an accidental cold or other circumstance will develop symptoms of alarm, both in the intensity of the degree and the rapidity of the manifestation.

PATHOLOGY.—We have seen that in the acute form there is a transudation of serum into the meshes of the submucosa, and a more or less extensive diapedesis of leucocytes, which, when not proceeding to suppuration, become organized into connective-tissue. These changes are for the most part identical, whether the infiltration be of the submucosa of the epiglottis, the inter-arytenoid or ary-epiglottic fold, or of the tissues beneath the vocal cords.

Independently of chronic serous effusion there is often an amount of thickening remaining after acute inflammations and attending many of the chronic forms of laryngeal catarrhs which are due to submucous hyperplasia. This is especially true of the laryngitis of drunkards, of syphilis, and of the subglottic hypertrophic inflammations.

This submucous thickening when occurring in the course of a chronic mucous laryngitis, especially if accompanied by local anæmia, is often premonitory of tuberculous deposit and breaking down.

The SYMPTOMS of a chronic œdema or submucous inflammation are generally those of the acute form with less active spasm, and of modified intensity generally.

The laryngoscope reveals the PHYSICAL signs of hypertrophy of the portion involved, the swelling being of a more solid and less translucent form than in the acute form. The character of the sub-cordal swelling may be seen in Fig. 19, PLATE VIII.

PROGNOSIS is grave, but the disease, though rarely subsiding entirely, may be very slow in its progress. Treatment is only of avail in so far as there may be a constitutional cause amenable to constitutional medication. But when chronic œdema is associated with perichondritis but little is to be done. Exceptions exist in the case of general or limited laryngeal œdema connected with

syphilis, and infra-glottic œdema when it occurs as a sequel of an acute infectious disease, unaccompanied with caries. Scarification is less likely to give relief in the chronic than in the acute form, because the effusion is of a much more solid character. This is particularly true of sub-glottic infiltration. In this variety there is a hope of saving life by early tracheotomy—the windpipe being opened as low as possible. The tube will very probably be required to be permanently retained. Chronic œdema in connection with syphilis will sometimes be relieved by large doses of potassic or sodic iodide. It is also particularly amenable to mercury, whether applied locally over the region of the larynx (Form. 79) or by general inunction.

Stenosis due to sub-cordal infiltration is rarely improved by dilatation, because the narrowing is by thickening of the lateral walls. Central stenoses are usually but not invariably due to syphilis, and their treatment will be considered in the chapter treating of that disease as it affects the larynx.

REFERENCES TO AUTHORITIES.

PAGE.	NO.	NAME.	TITLE OF WORK REFERRED TO.
298	1	Von Ziemssen.	*Cyclopædia of Medicine*, vol. vii. London, 1876-77.
299	2	Gottstein.	*Op. cit.*, p. 99.
299	3	Von Hoffmann.	*Œdema Glottidis.* Berlin, 1872.
299	4	Sestier.	*Traité de l'Angine laryngée œdemateuse.* Paris, 1852.
303	5	Cohen.	*Op. cit.*, p. 445.

CHAPTER XV.

INFLAMMATION OF THE PERICHONDRIUM AND CARTILAGES OF THE LARYNX.

(Figs. 77, 78, 79, PLATE VIII.)

ETIOLOGY AND PATHOLOGY.—In both syphilitic and tuberculous inflammation of the larynx, and also in carcinoma, resulting ulceration may extend to the perichondrium, and may lead to death and dislodgment of a portion or even the whole of a cartilage.

The cartilages of the larynx may, however, undergo degeneration quite independently of any of the dyscrasiæ just mentioned; and these changes may be brought about in three ways: (1) by ossification, proceeding to actual primary disease of the cartilage; (2) by fibroid degeneration of the cartilage; and (3) by disease commencing in the perichondrium. The first affection is one of old age, and may or may not be accompanied by deposits around the articulations; the second also occurs generally at an advanced period of life, though [1]I have seen one case, to be again mentioned presently, of this disease in quite a young girl; the third is due to traumatic causes, or is the result of the phlegmonous inflammation complicating typhus, erysipelas, etc. [2]Ziemssen, [3]Stöerk, and [4]Gerhardt have reported cases of perichondritis due to *decubitus*—that is, to pressure of the plate of the cricoid against the vertebræ in the case of aged persons confined to their bed, and obliged to lie constantly on their back, or as a result of any long illness entailing the same position. [5]Scanes Spicer similarly attributes the liability of this cartilage to perichondrial changes to the circumstance of irritation from the bolus of food as it passes into the œsophagus.

Most authors appear to consider that caries is a *necessary* sequence of perichondrial inflammation, but as I consider wrongly; for in not a few cases the inflammation terminates in resolution with more or less thickening and functional impairment, but without caries or separation of any portion of the cartilages.

Of the exciting causes to the first variety of perichondrial inflammation must be named, as almost invariably present, the

darthous influence, locally manifested; but occasionally primary perichondritis of the larynx may be exhibited as a form of senile phthisis. The following is an instance:

Mr. G. B., aged 53, residing at Newcastle, consulted me in September, 1878, by recommendation of Dr. Macaulay. He stated that he had suffered for five years from hoarseness, the cause of which he could not assign. This symptom had been unaccompanied with pain. Two months previously he had taken a severe cold in the head, which appeared to travel down to the throat; the voice became much worse, and a day or two later, on walking to his office, half a mile from his home, he noticed that his breathing was short. Though for some weeks he had experienced slight catching in his breath before sleep, it was only ten days prior to his visit to me that he had his first serious attack of dyspnœa, which awoke him from sleep at night.

The attacks were stridulous, and his respiration in sleep was generally very noisy.

The patient had enjoyed fairly good health, and as a superintendent of railway traffic, had travelled a good deal. During his journeys he had been accustomed to converse on business, and had often felt his voice tired. He had never had syphilis, and was an abstainer from alcohol and tobacco.

His family history was bad: his father, who had been asthmatic for many years, had died at 65; his mother of phthisis at 59, and two brothers and a sister of the same disease. One married sister, aged 50, was living, and in good health.

Examining the patient I found his *voice* almost suppressed, but occasionally giving a high-pitched hoarse note. *Respiration* was continuously embarrassed and stridulous, with spasm on the least exertion. It was always worse at night. *Cough* irritable, dry, and unproductive. *Expectoration* scanty and glairy. *Pain* only for the last two days, radiating from larynx to the ear. Slight tenderness on pressure over the right side of the larynx, at the situation of the thyroid cartilage, and especially over the cricoid. The soft tissues of this region were thickened.

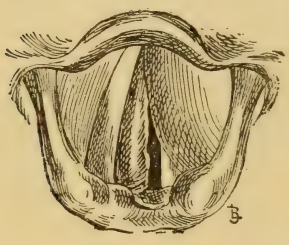

FIG. CXXVI.—PRIMARY PERICHONDRITIS OF LARYNX.

Examining the larynx the left vocal cord was obscured except at quite its posterior part, on account of inflammatory swelling of the corresponding ventricular band. The right vocal cord was somewhat congested at the posterior part, and the mucous membrane of the under surface along its whole length greatly infiltrated as with œdema, the swollen tissue being pink and translucent. The left vocal cord was quite fixed, and there was but little movement of the right. On auscultation of the lungs a very good percussion-note was obtained generally, though but little air was entering. There was no evidence of aneurism, of enlarged bronchial glands, or other disease, and the diagnosis was that of laryngeal perichondritis, probably involving all the cartilages, and especially the cricoid.

After consultation with Mr. Nunn, tracheotomy was performed with considerable relief to the breathing; but the patient's health was never regained, and Dr. Macaulay informed me of his death at home eighteen months later of gradual decline. His lungs were not affected, nor was there any actual evidence of abscess in the region of the larynx; but the pain and swelling continued, and even increased.

Fibroid degeneration, which is rare, is probably due to strumous causes.

The case to which I have alluded occurred to me in July, 1875, and came under my notice in consultation with Dr. Gilbart Smith. The patient, who was a slight delicate girl of 15 years of age, complained of severe difficulty of breathing, which had existed for three months, with loud stridor, both inspiratory and expiratory.

Tracheotomy was advised, but death took place suddenly and quietly on the day appointed for its performance. Autopsy showed œdema of the larynx with ulceration of the right cord, involving both the right arytenoid and the cricoid cartilages, which as well as the thyroid were unusually soft on section. The right bronchus, the right pneumogastric and recurrent nerves were embedded in a mass of hypertrophied gland tissue. The lungs and heart were healthy, and the case was considered by us as one of scrofulous perichondritis of the larynx. The Morbid Growth Committee of the Pathological Society confirmed our opinion, and reported that there was no evidence of either tubercle or syphilis.

Traumatic perichondritis is by no means so rare as is generally supposed, and is not a very infrequent result of intra-laryngeal operations for the removal of growths, or as the result of wounds by knife, sword, or gunshot. [6]Von Ziemssen has also alluded, as a by no means rare cause of cricoid perichondritis, to 'the frequent introduction of the œsophageal sound in persons whose cricoid bone is ossified.' Traumatic disease is generally confined to this cartilage and to the arytenoids; the thyroid is less liable to traumatism, but equally so to the other degenerative processes

I have never seen primary perichondritis of the epiglottis, though such a disease has been described: it must in any case be extremely rare. Spicer has mentioned such a case as occurring in a boy aged 10. In Fig. 78, PLATE VIII., is delineated what was believed to be gouty deposit in, or calcareous degeneration of, a portion of the epiglottis, and there were symptoms of gouty perichondritis around the right crico-arytenoid articulation. The patient was, however, only seen twice, and the after-history could not be ascertained. Acute perichondritis of the larynx is rarely primary, and, as in the cases just detailed, usually occurs in persons of advanced life. The following is, however, an instance of this disease in a child, and on account of its interest is narrated at length:

The case is that of F. B., æt. 12, to which brief allusion was made at page 283, when considering acute œdema of the larynx. The boy had gone to sleep in a hayfield one day early in July, after having become hot and tired with labour. On awaking he felt pain and stiffness in the neck. The next morning his mother roused him from sleep in the early morning because of the 'noise he was making in his breathing.' He felt intense ear-ache first in the left ear for three weeks, and then it went to the right ear, lasting on that side fourteen days. On the first morning he could not speak when awoke, but the next day could do so hoarsely. After that his voice became gradually reduced to a whisper. It had been quite lost for six weeks. The history given by Mr. Evershed, of Arundel, who brought him to me on September 15th, 1886, evidently pointed to acute inflammation of the whole tissues of the larynx and of the neck. He was immediately taken into the Central Throat and Ear Hospital. His condition was as follows: *Voice* quite extinct. *Cough*, none. *Respiration* embarrassed on exertion, noisy in sleep. *Deglutition* painful. *Temperature* and *pulse* normal. *Lungs* resonant in front, rather dull at upper posterior part; breath-sounds faint, harsh, and dry; expiration prolonged. *Appetite* good. Weight, 5 st. 8 lb. The neck was no longer swollen,

but there was distinct tenderness on even gentle manipulation of the larnyx externally, and the *pomum* was somewhat thickened. With the laryngoscope there was seen to be considerable œdema of both ary-epiglottic folds, and a thickened and somewhat granulated condition of the anterior two-thirds of the vocal cords, so that there was no space to be observed between them on full inspiration. The cords generally were inflamed, and the right cord, or rather its corresponding arytenoid cartilage (Fig. CXXVII.), was immobile.

FIG. CXXVII.

FIG. CXXVIII.

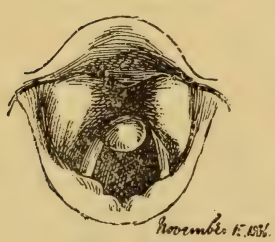

FIG. CXXIX.

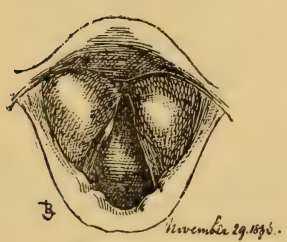

FIG. CXXX.

FIGS. CXXVII., CXXVIII., CXXIX., AND CXXX.—PRIMARY PERICHONDRITIS. VARIOUS VIEWS UNDER TREATMENT.

The *diagnosis* was that acute œdema and perichondritis had occurred simultaneously, and that both had now passed into the subacute stage.

He was ordered a milk diet, a Leiter cold coil to be worn constantly; hypodermic injections of $\frac{1}{15}$ grain of pilocarpine were made on the 16th, 17th, and 18th, and of $\frac{1}{8}$ grain on the 23rd, without much effect on the local condition. He had no other remedies for the first fortnight, when he was ordered iodide of iron with iodide of potassium, and frequent inhalations of the vapour of benzoin (Form. 29). The granular state of the cords decreased; but their median line of demarcation, as well as the difference of level between them and the ventricular bands, gradually became less distinct, and on October 14th these tissues appeared to have become quite united (Fig. CXXVIII.): there was a small rounded prominence at the most anterior visible portion of the right vocal cord, which was still impaired in mobility. On this day I first introduced Whistler's cutting dilator, and repeated its use on the 17th, and twice a week till November 4th, when the glottic space was seen to be much larger; but a well-defined sessile projection was now observed on the right vocal cord in the situation of the before-mentioned slight prominence. The larynx was still further opened with the dilator, and on November 15th the projection on the right cord was seen to be a distinct growth (Fig. CXXIX.). A wire loop and Voltolini's sponge were now employed, and after four or five operations, all trace of the growth was gone (Fig. CXXX.). After that Schroetter's No. 2 size hollow vulcanite dilator was introduced every other day, with occasional use of the cutting dilator. Return of the voice was first observed on December 6th, and from that time improvement was progressive. He left the hospital for a holiday at home on December 22nd with an open larynx somewhat hyperæmic; the cords devoid of new growth and both acting equally. He had a fairly good, though rough voice, and complete ease of all respiratory symptoms. He had gained 12 lb. in weight during his stay of thirteen weeks. On January 17th, 1887, this patient returned with voice much stronger, and the larynx generally less congested. The small portion of the larynx still adherent was divided, and dilatation continued till the opening was normal in area.

It is probable that in almost all perichondrial inflammations

which are not the result of traumatism, the disease commences in the neighbourhood of the crico-arytenoid joint. In many cases the delicate articulations between the arytenoid and cricoid cartilages become the seat of plastic transudation, and even after the acute stage of an inflammation has passed off partial or complete immobility of the vocal cords results. [7]Schroetter reports eight cases of stenosis due to anchylosis of the arytenoids from perichondritis following typhus. [8]Lunning, of Zurich, and [9]Sestier, both quoted by [10]De Havilland Hall, have found it frequently in typhoid. In both these diseases there is, of course, extreme exhaustion, and the patient is lying supine many weeks. How much, therefore, of the perichondrial changes may be due to a specific poison, and how much to *decubitus*, it is not possible to determine. Another form of this kind of anchylosis occurs in connection with tuberculosis, even before occurrence of ulceration; such a condition being analogous to the scrofulous stiffening of the larger joints.

I have seen two cases which I believe to be anchylosis of the crico-arytenoid articulation due to rheumatism.

One occurred in a young gentleman, aged, when he first came under notice, about 12. He has been under my occasional observation ever since, and is now about 23. His right cord is quite fixed, and his voice has always been hoarse, though it has improved in the last two or three years.

The other case is that of a man 73 years of age, at present attending the hospital, in whom it is impossible to otherwise account for the fixature of the right vocal cord, and for a persistent hoarseness. In the first case the arthritic diathesis was strongly manifested in the father. In the second, the patient has several evidences of the same condition in the joints of his hands, and in the cartilages of the ear (1887).

Other chronic forms of perichondritis, not leading to caries or abscess, are those associated with syphilis, and are the result of organization of the inflammatory exudation.

The following two cases are recorded as ordinary examples of secondary perichondritis, the first in connection with syphilis:

F. S., aged 39, a labourer, was admitted into the hospital, November 15, 1886. He stated that he had suffered from primary syphilis nineteen years previously, and since that time had had occasional sore throats. Two months before application 'he had noticed a lump in the apple of the throat.' It was not painful, nor did it interfere with his swallowing. His breath was short and his voice hoarse.

On external examination, a moderately soft semi-elastic bi-lobular swelling about the size of a hen's egg was observed in front and rather to the left of the larynx; situated on a lower level than would be the case had it been an enlarged bursa over the hyoid bone, and higher than the situation of the thyroid gland, it was judged to be a gumma, the diagnosis being confirmed by the presence of a 'punched-out' ulcer at the upper end of the swelling, about the size of a shilling, and a quarter of an inch in depth; and at the lower and left part a highly inflamed spot of rather smaller area.

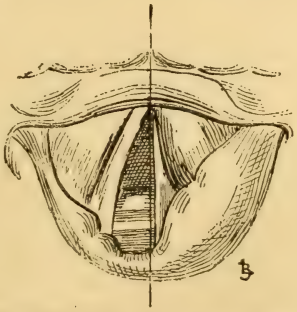

FIG. CXXXI.—SYPHILITIC PERICHONDRITIS.

On laryngoscopic examination the left arytenoid cartilage and left ary-epiglottic fold were seen to be greatly swollen, and the left vocal cord was immovably fixed (Fig. CXXXI.).

To complete the history, it may be briefly mentioned that the gumma over the larynx required opening in a few days; that the external ulcer healed under application of black wash, and that the general condition of the larynx improved under a course of twelve mercurial inunctions of the limbs and trunk. A gumma then developed in the posterior middle portion of the right lung, which was accompanied by high fever. This was reduced by local inunction and salicylates. Another gumma then developed in the soft palate above the right tonsil; this suppurated and required to be opened; concurrently he suffered from bi-lateral tonsillitis. He made in the end a good recovery, but though both the external and internal laryngeal swelling became much reduced, the vocal cord remained fixed. The patient was unable to take iodides in any form.

The next case is one of chondro-sarcoma, which recently occurred in the clinique of my colleague, Dundas Grant, who kindly permits me to quote it. The disease probably commenced in the region of the crico-arytenoid articulation, but later involved both the right side of the thyroid and also of the cricoid.

C. W., aged 43, a tramcar-driver, applied at the hospital on August 10, 1886, on account of pain in swallowing, which had existed for only a week or two, but had each day become intensified. Neither voice nor respiration were seriously distressed when first seen. On laryngoscopic examination the appearance in the accompanying drawing was presented. The infiltration of the tissues covering the right arytenoid cartilage was very considerable and semi-solid in character, and, as will be seen, the demarcation of the eminences of Wrisberg and Santorini were by no means lost, as is the case in simple serous œdema. The right cord was obscured by the swelling of the ventricular band, and the whole right side of the larynx was fixed.

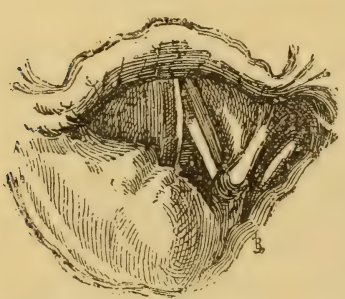

FIG. CXXXII.—LARYNGEAL CHONDRO-SARCOMA AND PERICHONDRITIS.

The diagnosis from syphilitic or other form of perichondritis was clearly established, not only by a general malignant cachexia of the patient, markedly present in this case, but also by the almost stony hardness of an external swelling in the right superior cervical region.

The temperature never ranged above 99°, and was frequently below normal. Once or twice it fell to 97·5°. The case progressed very rapidly, and the patient died away from the hospital on December 20, about four months from the date of his first symptoms. Unfortunately no autopsy was obtained.

SYMPTOMS.—It is hardly possible to follow the order observed throughout this work in the consideration of this disease, since in its subacute and chronic form it is so insidious that both functional and physical signs undergo very gradual progressive changes. The first symptom is generally one of localized **pain**, often ascribed to neuralgia; but careful external examination will frequently detect a slight unevenness at the painful spot, and the part will be distinctly tender to touch; sometimes there is to be felt by the surgeon a crepitation or grating similar to what one discovers on movement of an arthritic knee-joint; concurrently, or soon afterwards, the patient will complain of more or less

difficulty in **deglutition**, of a feeling of stiffness in the larynx, and of a 'catch' in the **respiration**, which will also be short on the least exertion. This question of dyspnœa is one of importance, as it will greatly influence indications for treatment. It may be due to 'œdema, immobility, and median position of one or both vocal cords, abscess, impaction of the necrosed cartilage in the glottis, collapse of the cartilaginous wall of the larynx, and finally in the healing of the ulceration; this is almost entirely confined to syphilitic cases' (Hall). Concurrently with the difficulty of breathing, the **voice** will be noticed to be hoarse, possibly rather high-pitched, and **cough** will become stridulous, and somewhat paroxysmal. With all this the patient will not perceptibly emaciate, unless the disease be associated with cancer or tubercle, or at least loss of flesh will be more gradual than is usual in either of these diseases; he will continue to take exercise, or even to follow his vocation; and the morbid condition may not vary, or the symptoms may only become slightly aggravated, for many months.

On **laryngoscopic examination** at this stage, physical changes will be by no means well marked. In many cases, beyond capillary injection of the mucous membrane, there will be little or no indication to the eye of the serious changes that may be taking place in the deeper structures. [11]Macdonald lays stress on what he terms a 'crowding of the laryngeal structures towards the middle line by surrounding perichondrial swelling,' a phenomenon by no means constant, and according to my experience most frequently manifested in syphilitic cases. When an abscess forms, it is very difficult to distinguish whether it arises as the result of a submucous inflammation or of a perichondritis. When the disease affects the thyroid cartilage there will be more or less tumefaction (sometimes almost inappreciable in amount), with some hyperæmia of the ventricular band of the affected side. If the arytenoid cartilage or the crico-arytenoid articulation be the part attacked, the vocal cord will be inflamed with possibly sub-glottic swelling, and especially will be observed more or less impairment in the action of the cord of the affected side (Fig. 77, PLATE VIII.). The arytenoids may be attacked singly or together, and by their enlargement encroach upon the lumen of the glottis. This also will be evident in the mirror. If the cricoid cartilage be diseased, the tumefaction, being situated beneath the vocal cords, may be at first unnoticed (Fig. 79, PLATE VIII.), or under certain conditions obscured. This is especially the case if one side of the cartilage be first attacked (a very rare circumstance), instead of, as is usual,

one of its plates, or if the disease commence in the perichondrial layer adjoining the œsophageal wall, which is also rare.

The following case, believed to be of this variety, and a secondary result of typhoid fever, is that of

J. H. McD., aged 28, an engineer, who was admitted into hospital on June 4, 1885, stating that he had only risen from his bed two or three weeks previously after a protracted attack of typhoid fever. For the last fortnight he had experienced difficulty of breathing, with gradual increase, so that now he had frequent attacks of choking, with cough and expectoration. He complained of no pain. Laryngoscopy showed a small erosion of the left angle of the epiglottis, and general laryngeal œdema, producing considerable stenosis. There was a suspicion of syphilis, though no acknowledged history, for there was an unindurated scar on the dorsum of the penis, and a shot-like string of glands to be felt in each groin. His *voice* was high-pitched and polyphonic; his *respiration* noisy and stridulous on inspiration. There was but little air entering his lungs, which were free from disease. He suffered from profuse nocturnal sweatings. He was ordered full doses of iodide of potassium; and a meeting was arranged for the purpose of performing tracheotomy, but the patient died thirty hours after admission. On *autopsy*, the *lungs* were collapsed, especially the right, and there was some muco-pus in the larger bronchi. There was no consolidation nor tubercle. *Heart* was healthy. There were three or four scars of recent ulceration near the *ilio-cæcal valve*. On examining the *larynx*, the mucous membrane was observed to be generally puckered and sodden. Pus was seen to issue from a small fistulous opening behind the juncture of the cricoid and thyroid cartilages rather to the left side, and in front of the œsophagus. On dividing the larynx from behind through the middle line, an irregular cavity, which extended laterally on both sides, was opened; it contained pus, and the left posterior plate of the cricoid cartilage was separated from the perichondrium, and was rough and necrosed.

It is equally clear that, under certain conditions of the cricoid cartilage, the action of the vocal cords may not be greatly impeded, and occurring, as the disease does, in old people, slight muscular palsy may not give rise to any apprehension. Hall, in the article already referred to, mentions that [12] Fraenkel explains the immobility and median position of one or both vocal cords as a mechanical result of the loss of attachment of the postici to the cricoid cartilage, and not as due to a paralysis of the nerves. If only a small amount of damage be done to the crico-arytenoid joint, when recovery occurs a mistake may be very readily made in regarding the fixed position of the cord as the result of paralysis of the crico-arytenoideus posticus. In the case of any patient coming with symptoms such as have been sketched, the greatest attention must be given to commemorative signs as well as to laryngoscopic appearances, for it very frequently happens that only by careful differentiation of points in the individual and family history can an exact diagnosis of the nature of the perichondrial disease be ascertained. There is very frequently a distinct personal experience of gouty attacks in other portions of the body, with evidence of deposit in one or more joints of the extremities.

At the time of writing my last edition, I had a case under my care in which slight dysphagia was the prominent symptom. The patient was a lady aged 62, and the opinion had been given that she was the subject of malignant stricture: she had recently

had an attack of gouty iritis ; she had chalky deposit in the distal phalangeal articulation of each little finger and in the auricular cartilages, and local manifestations in the larynx were gradually giving evidence of undoubted perichondrial change (Fig. 79, PLATE VIII.). The later history confirmed this diagnosis.

PROGNOSIS, COURSE, AND TERMINATION.—Perichondrial inflammation and degeneration of a laryngeal cartilage must always be viewed with real alarm as to the result to life. Cases (non-specific) have occurred, however, in which the arytenoid cartilages have been discharged and the patient has recovered ; and such a result has even been reported after extrusion of the plate of the cricoid. Chronic syphilitic perichondritis is not always fatal, though but too often an acute relapse occurs which calls for tracheotomy. Even when tracheotomy is not rendered necessary, there is more or less injury to both the vocal and the respiratory mechanism, from anchylosis.

The comparatively passive early stage of all forms of subacute perichondritis passes gradually into one of greater gravity if caries occurs; the urgency being caused by formation of an encysted abscess around the diseased cartilage, which in its growth greatly aggravates all the symptoms, and may lead to extreme stenosis of either gullet or larynx. This abscess may burst, and portions of necrosed cartilage be discharged from it.

If the abscess burst during life, it may open into the œsophagus, or into the larynx, leading—it may be—to a fistulous communication between these two passages; or, if the disease be anterior, there may be an external fistulous passage complicated by subcutaneous emphysema. Death usually terminates by exhaustion, from the suppurative discharge and consequent irritative fever, or it may take place even before the abscess is opened.

TREATMENT.—Beyond relief of the inflammatory stage by the application of continuous cold, sedative inhalations, etc., not much can be effected, because there is probably no measure which can prevent or arrest perichondrial caries or other changes when once established, and all the surgeon can do is by every care to perfect his diagnosis, and to watch attentively for signs of suppuration. He should then, if possible, open the abscess, having first, unless it can be reached from without, performed tracheotomy. On no account should the idea of laryngotomy or laryngo-tracheotomy, advised by some authors, be entertained ; indeed, it is very doubtful whether this operation should ever be performed except for quite temporary purposes. In all cases in which a tube has to be worn for any length of time, the further it is from the laryngeal cartilages, the greater the chance of the patient living more than

twelve or eighteen months after the operation, which is probably about the average extension of life usually gained by this means when performed for chronic laryngeal disease.

Where there is stricture of the œsophagus, feeding by the œsophageal tube may be employed; the irritation, however, of such an instrument is but too apt to increase the evil, and this method of nourishment should be reserved for those cases in which there is fistulous communication between the larynx and œsophagus.

There are few cases in which raw-egg feeding could not be pursued, to which may be superadded one or two daily nutrient enemata *per rectum*.

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CHAPTER XVI.

EXUDATIVE OR MEMBRANOUS INFLAMMATION OF THE LARYNX.

IDIOPATHIC AND TRAUMATIC.

Synonyms.—Membranous laryngitis; Croupous laryngitis; Cynanchea trachealis; Croup.

Although hitherto I have carefully avoided the temptation to indulge in dogmatic definitions of each separate disease as it came under consideration, it is necessary to say at the beginning of this chapter that by the term *croup* I mean a pseudo-membranous inflammation of the air-passages of an essentially non-infectious and non-contagious nature, which exhibits local rather than constitutional symptoms. The local signs are, to some extent, identical with the surface manifestations of diphtheria. Their effect on the constitutional state is altogether distinct and different.

It may be considered heterodox in the present day to express belief in the existence of a non-specific exudative inflammation of the larynx; the opinion is nevertheless still held—and, as I venture to think, correctly—by many able practitioners. Few authors of systematic treatises on medicine omit its consideration; and [1]Aitken may be taken to represent the sentiment of many doctors of great practical experience, but who may never have written a line on the subject, when he says that 'anyone who has seen much of croup in children can have no difficulty in recognising it as a disease very different from diphtheria in its attack, its course, and its results.' Aitken is supported in this view by such eminent authorities of the older school of modern authors as [2]Watson (earlier editions), [3]Niemeyer, [4]Burrows, and [5]Tanner, and by others more recent but equally distinguished—to wit, [6]Broadbent, [7]Roberts, [8]Wilks, and [9]Hilton Fagge. The last-named author draws attention to the circumstance that both [10]Home and [11]Cheyne, two of the earliest writers on

croup, 'were perfectly acquainted with the fact that the disease which they described was liable to be confounded with one which affected the larynx secondarily, having its original seat in the fauces;' and he goes on to say: 'Probably each of these observers had better opportunities of studying the relations of the two diseases than any London physician in the present day, and I think it is worthy of notice that if they should prove to have been wrong in regarding them as distinct, the progress of medical science will, in this instance, lead to a result directly opposite to that which it is bringing about in all other cases; for, in regard to every other group of diseases, the more our knowledge advances the more are distinctions and divisions multiplied.' For myself, I can say that the memory will never be effaced of the cases I saw of true croup when a pupil in the country between the years 1857 and 1859, a time when diphtheria was very rife, and when medical attention was being very urgently drawn to it and to the distinctions between the two diseases.

Leaving, for the moment, consideration of so-called idiopathic croup, we would draw attention to the fact that false membranes of essentially the same macroscopic and microscopic character as those of septic (diphtheritic) origin can be produced on the mucous lining of the buccal cavity and air-passages by every kind of traumatism, as, for example, irritant poisons, solid, fluid or gaseous, scalding water, scorching heat, chemical or galvano-caustics, or even strong eau de Cologne. [12]Oertel performed the experiment of dropping a few mimins of liquor ammoniæ into the trachea of seventeen animals, and succeeded, in every instance, in generating an artificial croup. Between these two extreme classes of exudative or membranous laryngitis—the one purely local in origin and effect, the second entirely constitutional—we have two other varieties: the first, which we call *croup*, a simple exudative inflammation, varying in the extent and consistence of the exudation according to the intensity of the factor, which is principally atmospheric; the second, a form of inflammation which may be mucous, submucous, or membranous, according to age and to the intensity of the factor, which last is not so septic as is that of diphtheria, so purely local as in the case of traumatism, nor dependent so entirely on hygienic conditions as in croup. We allude to the inflammations of the larynx which take place as secondary results of some of the exanthemata, of typhus and typhoid, and of erysipelas. All of these three classes of membranous inflammations are mainly distinguished from diphtheria by the conspicuous absence of certain grave constitutional symptoms and sequelæ.

These and other questions of differential diagnosis will preferably be discussed in our remarks on diphtheria, and we will at once proceed to the consideration of that affection which is ordinarily and tersely designated as *true croup*, or, since that term is held by many to be misleading and incomplete, of *simple exudative laryngitis*. We prefer the term exudative to membranous, for, although in an extreme case of croup, the formation of false membrane constitutes one of its most serious manifestations, there are other varieties of laryngitis in children less severe in their objective evidences, but presenting exactly the same functional symptoms and hardly less perilous to existence. Thus almost all authors agree with Aitken to have two forms of croup—the *mucous* and the *fibrinous;* and [13]Cohen goes so far as to subdivide the disease into three varieties—the *catarrhal*, *membranous*, and *suppurative*. These subdivisions are of importance, in so far as they emphasize the view that the disease is one of simple and not specific character. In a measure also they may be said to influence prognosis. Fagge considers two kinds of croup, one which he somewhat unfortunately denominates the *spurious*—without exudation—but which he carefully distinguishes from *laryngismus stridulus;* the second, *membranous*. He appears to consider the first merely as a milder form of the second, and differentiated principally by the absence of exudation. His opinion on this point, therefore, is in accordance with that of Aitken.

Etiology.—The disease is essentially one of childhood, and is seldom observed before the first year of life, or after the period of first dentition. We have repeatedly stated a belief that anatomical differences in the structure of the mucous membrane account mainly for the greater frequency of exudative, and for the rarity of submucous, inflammations in children as compared with adults (see pages 275 and 298). Holding this view, we need say no more as to the causes of membranous laryngitis than that they are for the most part the same as those of acute laryngeal œdema.

We find, for example, that exposure to keen northerly or northeasterly winds, and a surface-chill, are pretty generally assigned as the origin of croup. There is undoubtedly also a constitutional state, by no means accurately determined, which appears to predispose certain families, and certain members of a family, to this form of inflammation. Children liable to croup for the most part suffer during dentition, and have a tendency to rachitis and intestinal irritation; they are also subject to influenza, to bronchitis, and to pneumonia, as well as to catarrhal and inflammatory affections of the respiratory organs generally, and they are readily

susceptible to be attacked during epidemics, such as measles or whooping-cough. Seeing how strong a predisponent to bronchitis is mouth-breathing, it is quite likely that the presence of adenoid growths in the vault of the pharynx which obstruct free nasal respiration, would, if searched for, be found in many victims to croup. Not only is the mucous membrane very sensitive, but there is an unusually delicate character of the skin, the epidermis of which is abnormally thin, so that the superficial veins of the face, trunk, and limbs are much plainer observed than in others not so constituted. Boys are said to suffer more than girls; but the accuracy of the statement is questionable. There is, however, no such doubt in my mind as to the influence of heredity. The assertion that robust children are more liable to croup than delicate applies with more accuracy to the false or spasmodic form than to the inflammatory. Niemeyer has found that children liable to be attacked have a tendency to moist eruptions, or to acute hydrocephalus; and 'it would appear that croup not unfrequently begins very soon after the disappearance of a moist eruption on the head or face.'

Croup is said to be epidemic or endemic; but such a circumstance is doubtful, and, since all evidence goes to show that croup is not contagious, an explanation of the occurrence of more than one case in a house or a district is always to be afforded by the existence of simultaneous climatic, atmospheric, and constitutional causes. The affection is more common in the country than in towns, which fact may be probably explained by the circumstance that atmospheric and other climatic causes are less neutralized in the distantly separated dwellings of rural districts than where many buildings are gathered together.

Pathology.—The morbid process of exudative laryngitis has been already considered in its etiology. It only remains to say a few words as to its histological features.

The mucous membrane is seen to be always more or less hyperæmic, whether in the simple catarrhal or in the exudative variety; and if this condition is not universally witnessed on autopsy, the circumstance, as Niemeyer has shown, is principally 'due to the richness of the laryngeal mucous membrane in elastic fibres, which remaining extended by the blood contained in the vessels during life, after death contract and expel the contents of the capillaries.'

The exudation, when present, is usually composed of two layers, a superficial and a deep; the former consists of the thickened original epithelium layer, whose cells have undergone proliferation

and mucoid degeneration, in fact so-called catarrhal changes; the deeper layer is seen under the microscope to be composed of a number of strata of fibrinous or *membranous* material often enclosing leucocytes. In some circumstances the exudation is pultaceous, instead of being fibrinous or membranous. In these less advanced patches, therefore, the morbid appearances are mostly superficial to the basement membrane, which is superimposed on a merely hyperæmic submucous tissue. When only the superficial layer is present, we have the *catarrhal* variety, while the deeper exudation layer is indicative of the *fibrinous* kind. In the more rare and graver cases, the so-called *suppurative* variety, the submucous tissue in addition is swollen; its meshes are filled with fibrinous coagulated matter and leucocytes; and in time the vessels become blocked; circumferential necrosis takes place, with the result that the sequestrum or 'false membrane' is thrown off. As will be seen in the next chapter, the whole process differs in no essential feature, anatomical or microscopic, from what takes place in diphtheria; but it may be noted that the membrane of croup is not capable of reproducing the disease by inoculation, as has been proved to occur on similar experiment with diphtheritic membrane. Allusion may here be made also to the question of micrococci in the membrane of true croup. The subject is discussed at greater length in considering the pathology of diphtheria, and no more can now be said than that they are less frequently found, and in fewer numbers, in croup than in diphtheria, and in the larynx than in the fauces. On the other hand, they have been witnessed, at an early period, on false membrane produced artificially by the caustic action of liquor ammoniæ.

Symptoms: A. Functional.—Although, as a rule, some premonition is given in the shape of slight fever, coryza, and other signs of a common cold, change of **voice** is often the first characteristic symptom of croup, and it may precede those of a more alarming nature. Beginning as a simple catarrhal hoarseness, it is soon observed to assume a metallic *timbre* and to be raised in pitch. In the later stages it becomes completely suppressed.

Embarrassment of **respiration** is at once the most serious and distinctive evidence of croup. Sometimes two or three days—*more often only a few hours*—after the first warning of any disorder of the health, the little patient will be awoke from sleep near to midnight with an attack of paroxysmal dyspnœa of the most painful and alarming character. Amongst the first causes of respiratory distress is the impediment to entrance of air, this being in the early stages due to pure spasm of the laryngeal and

tracheal muscles, voluntary and involuntary; later, it may be caused by mechanical obstruction from the presence of false membrane. As a result of this impediment the inspiration is markedly prolonged and consequently of diminished frequency. Each inspiration is attended by a peculiar stridor which constitutes one of the most marked characteristics of the disease. This stridor has been variously described as high-pitched, piping, shrill, metallic, sibilant, and wheezing. It is also generally likened to the crowing of a cock, and it is from this resemblance that the disease derives its appellation of 'croup,' the word being applied also in its adjectival qualification to symptoms of cough and respiration when partaking of this character, though occurring in connection with diseases of a quite different nature. An anatomical peculiarity of the dyspnœa is the *indrawing* of all the muscles, both supra- and sub-sternal, as also of the epigastrium, the false ribs, and even the lower portion of the breast-bone itself —of those parts, in fact, which would generally be distended in healthy inspiration. It is useful to note that in rickety children the diagnostic importance of these phenomena may easily be exaggerated.

All these respiratory muscles of the chest and abdomen, regular as well as auxiliary, are observed during the spasm to work painfully; the nostrils are dilated, and the whole expression and movements of the face and limbs give evidence of a laborious struggle for breath. The complexion becomes turgid, and even livid, and death from apnœa appears imminent, and may even occur. In happier circumstances the paroxysm may be somewhat modified, to again quickly recur, so that it may last altogether for an hour or more. As the spasm passes off the little sufferer will fall back exhausted, or subside into a restless sleep, from which he will again be aroused, it may be, in a few minutes, or—in the earlier stages, during the day, and on subsidence of the disease—at intervals which extend to several hours. In all cases the attacks are both more frequent and more serious during the night than in the day; diminution in the periods of remission is an unfailing evidence that the disease is progressing unfavourably.

Accompanying, and often preceding, distress of breathing is the symptom of **cough**, also one of a most distinctive character. It has a high-pitched, metallic, and ringing sound, generally denominated 'brassy' or 'laryngeal,' and once heard is speedily recognised even by the non-medical ear. This noisy character is, however, gradually muffled, and may be completely suppressed with advance of the malady, so that, as Cohen says, 'the child will

be *seen* to cough without making noise enough to attract attention.' The cough is unproductive of expectoration in the early stages of any case, except of scanty mucus of glairy viscidity, and also at a later period, when the disease is not progressing towards recovery; but where, as in favourable circumstances, the membrane is thrown off, large flakes or even complete casts of portions of the air-passages will be expectorated, and the metallic sound of the cough will become changed to the moist tone of a remitting laryngitis or bronchitis.

Difficulty in **deglutition** is not a frequent, or by any means a marked symptom, but the throat is naturally very sore, and the act of swallowing is therefore somewhat painful.

There is, moreover, very distinct tenderness of the throat on even slight external palpation of the larynx and trachea. The fact that the child during an attack frequently clutches at the throat might appear to indicate existence of actual **pain**. It is probable, however, that this act is rather suggestive of an effort to dislodge the source of impediment to breathing, for very young children will often be seen to thrust their fingers far in their mouth, as if for that purpose; and others may be witnessed endeavouring to promote vomiting by tickling the back of their throat.

B. Physical.—A laryngoscopic examination is by no means an easy matter in the case of an infant or very young child attacked seriously with croup; but if it can be made, the diagnosis, which has in all probability been already formed by observance of the functional symptoms, will be strengthened.

The normal **colour** of the larynx will be seen to be intensified by inflammation; the **form** of the glottic chink may be narrowed by swelling, and by the presence of false membrane of a white pellucid appearance; but failure to discover false membrane in the larynx by no means implies that there is not exudation in the infra-glottic region.

Mobility of the laryngeal respiratory muscles may be impaired independently of the spasm.

The fauces, tonsils, and pharynx will also be uniformly inflamed in varying degree, and, *rarely*, membrane may be seen on their surface. This may be due to temporary lodgment of a piece coughed up from the lower passages. An actual exudation in this region, either anterior or subsequent to laryngeal symptoms, would indicate, to my mind, the probability that the case was one of diphtheria. This point is, however, not conceded by Fagge, who will only 'admit that in very rare cases a diphtheria

may begin in, and remain limited to, the air-passages; but he thinks it very much more often happens that a non-specific membranous croup extends to the tonsils and palate.'

Whenever membrane is expelled, the surface of the epithelium whence it is shed is denuded; and as diphtheria may be developed on an abraded skin, so it is quite possible that in certain circumstances the same may take place as a secondary development in a case of croup. Indeed, the almost invariable pre-existence of a high grade of hyperæmia in diphtheria has led to the suggestion that not a few cases of this disease originate by septic causes superposed on a simple catarrh.

Where examination of the throat is not possible, the presence in the expectoration of exuded flakes and casts will be the chief physical sign on which dependence can be placed.

C. Miscellaneous symptoms of croup are important and distinctive. The pulse, at first quick and full, becomes strong and bounding. The *temperature*, though high (102° to 104° F.), is not subject to the frequent variations of diphtheria, and has a tendency to abate as exudation is poured out. *Thirst* is a prominent symptom, and the patient is irritable, restless, and anxious. *Albumen* is rarely to be found in the urine, and when present has no more significance than as an indication of the temporary increase of blood-pressure in the renal capillaries, often associated with pulmonary complications. There is never any evidence of nephritis; recovery is not retarded by such *sequelæ* as *paralyses*; the *glands* of the neck are not, as a rule, enlarged or painful.

Diagnosis.—Postponing consideration of the differences between croup and diphtheria until after description of the latter disease, it is difficult to see with what other affection it can be confounded. The history of the attack, the absence of fever and cough, and the complete remission of all symptoms between the attacks which distinguish *laryngismus stridulus*, or false croup, are sufficient to prevent the graver from being mistaken for the milder malady.

With regard to the analogy between infantile croup and adult laryngitis, Aitken says that the latter 'is marked by the same difficulty of breathing, the same constriction of the throat, the same paroxysmal attack, and by the same exemption from any severe constitutional affection.'

Prognosis, Course, and Termination.—Even mild attacks of croup should give cause for anxiety, for neglect of a simple case has frequently been followed by aggravation of the malady, and by a suddenly fatal termination.

Mortality from membranous laryngitis in the child is very great, and it is generally agreed that as many as 50—Fagge says 60 to 70—per cent. of those attacked succumb; while as many as 8 per cent. of all deaths between the ages of two and seven years are stated by some authors to be due to this disease. Age is an important element in prognosis; the older the child the more favourable is the chance of its recovery. The greatly diminished number of cases of croup in more modern returns illustrates, in a marked manner, the hold that the doctrine of identity of it with diphtheria has taken in the profession. Nor could it be otherwise, since so many teachers in schools are of that opinion. Among country practitioners, however, the contrary view is firmly held. It is, of course, very probable that before any attempt was made to separate the idiopathic and the septic forms of exudative laryngitis many cases of death from laryngo-tracheal diphtheria were recorded as croup. In the present day it is equally likely that a mistake is made in the contrary direction.

In the course of the disease towards restoration to health gradual separation of the membrane takes place, followed by free mucous expectoration and diminution in the severity and stridulous character of the cough and respiration. In milder cases there may be no objective evidence of membrane at all, the exudation having either not arrived at the stage of fibrinous deposit, or having become pultaceous before release.

The duration of a case in its acute form is from four to ten days; complete recovery being delayed to a month or five weeks; and in some instances being followed by one or more relapses.

When the disease takes an unfavourable course, the paroxysms become more frequent and almost unremitting; the cough, although toneless, is more distressful; the pulse-beats are more rapid, the little patient is more restless, and the extremities become cold; finally they, as well as the countenance, become cyanotic.

The fatal issue may occur in any of the following ways: by apnœa, or by convulsions during a paroxysm of dyspnœa; by asphyxia through actual blocking of the air-passages with membrane, or by carbonic acid poisoning; by deposit of fibrin in the heart; by exhaustion and coma; and finally by secondary lung-complications. The date of a fatal termination is seldom extended beyond the fourth or fifth day, unless tracheotomy has been performed, in which case, even if life be not saved, death may be somewhat delayed.

Regarding the convulsive nature of the paroxysms, [14] Ferriar has reported a case in which the struggle was so violent that

after death the corpse, in a great measure, rested on the occiput and on the heels.

TREATMENT of croup requires to be pursued with energy and discretion from the first. Probably few practitioners now employ *bleeding* followed by *blisters*, and administration of *mercury* to the extent of three or four grains of calomel with antimony every few hours, or active mercurial inunction; yet such was the teaching in quite recent times. Of general measures of traditional repute there is, however, much to be said in favour of an emetic given at the first onset of an attack, and it is indicated on the following grounds: 1. There is reason to believe that irritation of the gastric portion of the vagus may play some part in predisposing to true croup as it does to false. 2. An emetic not only relieves a possibly overloaded stomach, but it also favours a prompt alvine evacuation, diaphoresis, diuresis, and a diminution of the febrile state generally. 3. Should membrane be formed in the trachea or bronchi, as is not unfrequently the case *before* the manifestation of laryngeal symptoms, an emetic may possibly favour its expectoration. The best form of emetic is ipecacuanha, with a small portion of tartar emetic—say five grains of the former with a quarter of a grain of the latter to a child from two to five years of age, moderating the dose according to circumstances. By some the hypodermic administration of apomorphia may be considered preferable; the dose for a child of from two to seven years old is one-twentieth to one-tenth of a grain; the solution must be made fresh.

Emetics are not to be repeated continuously, as is, by many, recommended, but may be administered with advantage in later stages where evidence of false membrane is unmistakable, but where its elimination is difficult. For this purpose sulphate of copper is preferred to ipecacuanha by Niemeyer, who recommends two to five grains to be dissolved in an ounce of water, of which a teaspoonful is given every ten minutes until emesis is produced. Personally, I should be afraid to give this remedy to young children, for fear of inducing enteritis; I would also caution against repeating emetics in cases where reflex action has become enfeebled, lest on recovery—say after tracheotomy—the reaction be attended by dangerous and even fatal consequences.

If the pulse continues full, and the paroxysms are not reduced, I would prescribe half or one grain doses of calomel with two of James's powder and half a grain of Dover's every one or two hours for four to six doses.

From experience of pilocarpine in other diseases it is probable

that hypodermic injection of a solution of this drug in doses of one-twelfth of a grain might be of service. Aconite in quarter or half minim doses every fifteen to thirty minutes, till the temperature is reduced and the heart's action lowered, is also valuable in early stages.

Beyond giving barley-water as the principal beverage (in which may be dissolved bromide of sodium or ammonium), or warm milk with lime-water, I would advise no other internal remedy. Dundas Grant reports to me that an old practitioner, with whom he was long associated, treated croup with great success on the following routine: A grain of calomel every four or six hours, and a mixture containing 3 to 5 minims of ipecacuanha wine and 3 to 5 grains of bromide of potassium every two hours.

Locally, hot poultices, stupes, and sponges are still in vogue; but I prefer the application of continuous cold externally by the Leiter coil, already so frequently advocated. This application does not allow cold moisture to drip down the neck and chest, nor does it damp the night-dress and sheets as do cold cloths, or ice bladders. On the other hand, it is quite as easily retained as a poultice or sponge, and in the more recent form of its inventor is of no great weight. Whether for the purpose of reducing the inflammation, of modifying the spasm, or of favouring rapid separation of the membrane, application of continuous dry cold is to be preferred to that of *moist* heat, which is almost always followed by chill; and should warm applications be preferred to cold, they can equally well be applied by the coil.

There is a general consensus in favour of an atmosphere hypersaturated with steam; but I am inclined to think that this treatment is often carried to excess.

The bed should be curtained, and vapour brought near it by means of a steam-kettle, but the croup tented-bed, which gives the little patient a continuous vapour bath, is as unnecessary as it is depressing. If vapour is required to be brought nearer to the child's mouth, that purpose is best effected by a steam draught inhaler with plain water, or with benzoin and chloroform (Form. 30). Such an inhalation may be frequently repeated.

Nor do I prescribe applications of solutions of nitrate of silver, so strongly recommended by Niemeyer, or of other mineral; for such applications, however mild, especially the first-named, are provocative, not only of spasm, but of coagulation of the ordinary secretions of the mucous membrane. The use of the croup brush is also to be carefully avoided, unless the practitioner is *quite prepared to perform tracheotomy immediately afterwards*, for the

forcible disturbance of membrane is very apt to block up the narrow glottic chink, and so to lead to serious and even fatal suffocation, and this quite apart from the dangers of spasm. The same caution is to be observed in relation to attempts at 'intubation,' which is elsewhere considered at greater length. Cohen advocates lime-water spray inhalations for the purpose of dissolving the membrane; but it is doubtful whether they ever reach the seat of exudation until it has extended upwards into the larynx, whereas we know that in many cases the supra-glottic region, although the seat of intense inflammation, may give no evidence at all of the presence of membrane. Applications of cocaine by spray or brush would also, in all probability, fail to reach the seat of disease independently of the difficulty of their administration; but hypodermic injection of very small doses—say ℥ij. to ℥v. of a 4 per cent. solution—in the neighbourhood of the larynx would, by analogy, be of double service in allaying the spasm and in slowing the pulse.

Operative measures consist mainly in performance of tracheotomy, and in subsequent attempts to clear the air-passages of membrane below the tracheal opening. These points will be better considered in detail at the end of the next chapter in relation to diphtheria, and it is sufficient to say here that the procedure to be successful must be adopted early. It only remains to say a few words regarding

Hygienic and **prophylactic** treatment. Having seen how powerful is the noxious influence of cold as an etiological factor of croup, it naturally follows that the greatest care must be taken during the convalescence of a child subjected to an attack, as to a properly warm atmosphere of his sleeping and living rooms, protection from draughts, equable distribution of clothing, and from exposure by outdoor exercise to the unfavourable influences of inclement weather; and these hints apply equally to the insurance of immunity from recurrence, and as prophylactic in the case of those children who may be predisposed to croup. Attention should also be directed to correction of any of the constitutional diatheses to which we have referred as offering a tendency to croupous inflammations, and suitable treatment should be adopted for the eradication of adenoid growths, or any other local condition of the throat favouring catarrh.

TRAUMATIC CROUP.

This condition does not require lengthy consideration. We have already, at p. 302, alluded to the nature of the injuries and poisons which will induce membranous exudation of the mucous membrane of the air-passages. Such a condition is generally seen in the case of children, whereas similar causes will, in the adult, be more frequently followed by submucous infiltration and acute œdema.

The SYMPTOMS are in no way different from those of idiopathic croup, except that general **pain** in the region of the throat and larynx is naturally greater, and that the act of **deglutition** is especially difficult and distressful. **Respiration** is impeded by the presence of the false membrane, and also by spasm independently of mechanical obstruction, for many fatal cases have been recorded in which no exudation has been found below the level of the epiglottis. Where the vocal cords are involved, the **voice** will be reduced to a mere whisper, and **cough** will be frequent.

The case which [15] Dr. Whitehead Reid has so carefully recorded in the *Medico-Chirurgical Transactions* is one of great interest in several particulars: The patient was a lady, aged 27, who by accident received some eau de Cologne into her trachea by her nostril. It is to be noted that—1. Membrane was profusely developed on the third day, showing that traumation of this nature has the power to produce exudation of equally strong consistence as diphtheria even in the adult. 2. In addition to the foregoing there was laryngeal œdema. 3. There were no enlarged glands. 4. On the fifth day a perfect 'cast' of the larynx, trachea, and upper part of the left bronchus was expelled entire, in one piece, with immediate and great relief, her voice returning at once. 5. In three weeks from the accident she could sing again. 6. There was never any paralysis. 7. The urine never contained albumen, although respiratory obstruction and distress had been extreme. 8. All possibility of the coexistence of the poison of scarlatina, typhoid, or diphtheria was negatived. 9. Neither of her young children, who were constantly with her, became ill. 10. The microscopical features of the membrane were similar to those of diphtheritic exudation.

PROGNOSIS.—Recovery from traumatic croup is rare, and depends on the age of the patient, on the nature of the traumatism, the extent of air-passages involved, and last, but not least, on the promptitude with which active remedial measures are adopted; failure in this last respect not being by any means often the fault of the medical adviser, but of the parents who are loth to give

permission for performance of operative measures until the chance of their success is much lessened by delay.

TREATMENT resolves itself mainly into a prompt performance of tracheotomy in the case of children, and—it may be—in adults also; with external application of cold, and the internal administration of emulcent and refrigerated drinks. There is generally great prostration, and stimulants by enema or otherwise should therefore be administered early. In some cases food will require to be given by the stomach-tube.

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319	5	TANNER.	*Practice of Medicine*, 6th ed. London, 1869.
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319	10	HOME.	*Inquiry into the Nature, Cause, and Cure of Croup.* Edinburgh, 1765.
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320	12	OERTEL.	*Ziemssen's Cyclopædia*, English translation, vol. ii.
321	13	COHEN.	*Op. cit.*, p. 460.
327	14	FERRIAR.	*Medical Histories and Reflections*, p. 135. London, 1798.
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CHAPTER XVII.

DIPHTHERIA.

(Figs. 42 and 43, PLATE V.; Fig. 55, PLATE VI.; and Fig. 117, PLATE XIV.)

IN contradistinction to our definition of croup as an exudative or membranous inflammation of the air-passages only, of non-infectious and non-contagious character, by the term diphtheria is understood an inflammation both of the pharynx and larynx, which is equally characterized by the formation of exudation of false membrane; but it is *highly contagious*, and it exerts a powerful influence on the constitution.

ETIOLOGY.—**Nature of the Contagium.**—[1] Semple 'believes it to be impossible, with our present knowledge, to recognise diphtheria as a distinct inflammatory disease,' although the contrary view is held by all French writers from [2] Bretonneau down to the present time. Semple decidedly underrates the inflammatory phenomena, both local and constitutional, of the affection; nevertheless, the great analogy of its course and manifestations to the general specific diseases of the type of scarlet fever and typhoid, has long caused diphtheria to be reckoned one of the specific zymotic fevers by the highest medical authorities. Its contagiousness has accordingly been explained or accounted for by the particular theories which have from time to time been in vogue concerning the nature of contagion.

Most English writers hold the view that diphtheria is a constitutional specific fever with local manifestations primarily and principally in the throat and larynx, but many Continental and American authorities regard it as primarily a local disease with secondary manifestations.

The Germ Theory.—From the fact that vegetable organisms are undoubtedly in many instances to be found in or on diphtheritic products, it has been argued that *bacteria* are the carriers of

contagion, if they are not themselves the cause of the disease; but it is at present by no means clear what is the exact part played by the vegetable organisms which are to be found on the false membranes, and by those less frequently to be seen in the substance of the kidneys, in the blood, and elsewhere.

Many foreign observers have from time to time been reported to have found an organism peculiar to diphtheria; Löffler, Cornil, and Babès have recently confirmed the earlier researches of [4]Klebs. [5]Emmerrich has also discovered specific micrococci and bacilli, of which he made cultivations, and succeeded in reproducing the disease by inoculations. [6]Wood and Formad arrived in 1881 at similar conclusions by a very careful course of experiments during an epidemic on the borders of Lake Michigan, U.S.A. Amongst the latest researches on this subject are those of [7]Prudden, of New York, who believes the chain-forming coccus —streptococcus—to be the specific microbe. We must not hastily assume, however, that these organisms are either the invariable cause or the constant carriers of contagion; but later research makes it evident that bacteria are very frequent, probably invariable, concomitants of the disease. Recalling the fact mentioned in the last chapter, that Oertel found micrococci, which a previous observer had regarded as specific, present in membrane artificially produced by the action of *liquor ammoniæ* very shortly indeed after its manifestation, it is furthermore true that very many different pseudo-pathogenic micro-organisms, including the Klebs-Löffler bacillus, are in health sometimes to be found in the buccal and pharyngeal cavities in small numbers, and either they or their spores are frequently present in the atmosphere. That such bodies should be capable of conveying contagion after contact with an infected surface is neither anomalous nor surprising; but it is still regarded by some as doubtful whether we are justified in crediting microbes with any larger share than this in the infecting process.

Ptomaine Theory.—It is well known that there are other concomitants besides microbes in all putrefying and necrosing decomposition. I allude to the formation of various chemical compounds, more especially to the alkaloidal bodies known as *Ptomaines*. Numbers of these substances have been shown to be formed during the various stages of the decomposition of the human *cadaver* and of other animal matters; they have also been found in peritoneal fluids, pyæmic abscesses, the contents of the stomach, in the urine in typhoid and scarlet fever, and in regions which have been characterized by putrefactive changes *during life*. They are no doubt present in diphtheritic membrane, more

especially in sloughing and necrosing patches; and there is little doubt that these ptomaines are the result of the putrefactive and fermentative changes with which vegetable organisms are invariably associated. The idea that a ptomaine is the chemical *contagium* which spreads the disease (through its presence in water, milk, and other known channels of contagion) was put forward as a tenable hypothesis in the last edition of this work. It is, however, more probable that germs are the true element of contagion, and that the resulting chemical poisons are the causes of some after-symptoms. Thus may be especially explained asthenia, septicæmia, and paralysis—symptoms of diphtheria which are strongly suggestive of slow alkaloidal poisoning.

The contagious material is believed to be associated only or chiefly with the deposit which forms in the throat and other parts; this infects the contents of the alimentary canal, the nasal and buccal excretions, and possibly the breath. Water, milk, or food contaminated either by contact with some of the false membrane itself, or with some of the above-named excretions, constitutes a fertile source of disseminating the disease.

By what agency a medical attendant, or other person, with every precaution against infection, takes the disease by merely breathing the same atmosphere as a diphtheritic patient for only a few minutes, it may be—it is difficult to explain; —though doubtless it might be advanced that in most of such cases the conveyance of contagion is more material than is often admitted. There are, however, many isolated cases which can only be explained by supposing that germs from a diphtheritic patch contaminate the breath.

Supplementary experiments may demonstrate the presence of a different chemical poison for each of the various exudations, sometimes associated with the secondary membranous throat lesions of the exanthemata and other fevers.

The tendency in this country at the present day, especially amongst younger and more advanced pathologists, is to accept provisionally the notion that diphtheria is at first a local disease associated with the growth, on some mucous membrane or abraded spot, of micro-organisms. During the course of an epidemic it is supposed that spores enter, say, the mouth of an individual, and either do or do not find in the oral secretions of such individual, after being challenged by the scavenging leucocytes, a suitable culture medium. If the *nidus* be a favourable one the microbes germinate on the mucous membrane of, for example, some part of the pharynx or fauces; as reproduction

proceeds apace, the multiplied organisms in the course of from two to eight days pass into the tissues, and this invasion soon results in those pathological changes so characteristic of diphtheria, the false membrane. The life processes of the multiplying microbes are accompanied by fermentative changes and the production of poisonous albumins and ptomaines, which pass into and contaminate the blood; systemic poisoning is thus accounted for.

In this connection the question arises, Why, if the oral secretions form a suitable culture medium for the *multiplication* of the organisms (an essential feature in the infecting process), is it that the mucous covering of the tonsils and other lymphoid masses is most usually the area invaded by the microbes? In answer to this query, it may be pointed out that the tonsillar mucous membrane is more pervious to living organisms than any other because of the diapedesis of leucocytes, which is continually going on through it. Moreover, the crypts of the tonsils form quiet recesses for the incubation and subsequent germination of microbes. It is probable that in most instances where those exposed to infection have not contracted the disease, the leucocytes secreted by the tonsils have checked the germination of the organisms. Where, on the other hand, the tonsils are diseased, phagocyte-production is diminished, and such individuals are more liable to contract the disease when exposed to infection.

Inoculability.—[8]Trousseau and others having failed in certain experiments made on themselves and on rabbits, the inoculability of diphtheria was at one time disputed. There is now, however, no doubt that the disease can be transmitted by the application of necrosing membrane to mucous or abraded cutaneous surfaces. The number of medical victims of the heroic, but none the less reprehensible, practice of extracting membrane through tracheotomy-tubes by their own lips, instead of applying artificial suction, is a striking testimony to its direct contagiousness. The failure of the experiments of Trousseau and others just alluded to can be readily explained by our own view. First, that diphtheritic contagium requires a suitable *nidus*, or soil, for its development; and secondly, that all stages of the exudation are not equally active in their infective capacity.

Our first proposition will be readily conceded, and is proved in a measure by the happy miscarriage of Trousseau's rash experiments on himself. The recent investigations of [9]Renshaw confirm the second; for the fact that many animals, especially the carnivora, can be infected by inoculation with a portion of

diphtheritic membrane has been abundantly proved; and the author just named has conducted a series of highly interesting experiments, of which the following is a brief *résumé*. Portions of greyish-white membrane were mixed with the food of six cats, and in every case the disease was reproduced with the characteristic lesions and symptoms. Experiments on fourteen cats, with the younger yellowish-white membrane, and with grayish membrane which had been soaked in Condy's Fluid, or in hydrochloric acid, produced only negative results. This observer failed to reproduce membranous laryngitis (true croup) by this method. Experiments with graminivorous animals were not successful. This latter fact throws light on the cause of the failure of Trousseau's experiments on rabbits, though it is to be mentioned that Formad and Wood succeeded in inoculating rabbits even with cultivated material. It only remains to be added that diphtheria has been communicated to human beings from hens, pigeons, calves, and various domestic animals.

Mode of Origin and Dissemination.—Diphtheria may arise either *epidemically*, *endemically*, or *sporadically*, and *separately*. There can be little doubt that these distinctions depend on some ill-defined though fairly well understood insanitary circumstance of region, atmosphere, or individual; for, while the disease will be manifested year after year in certain towns, streets, or districts, so long as the insanitary condition of the infected neighbourhood is neglected, attention in that direction will often banish the disease, to reappear if the laws of health are again disobeyed. That the disease may be eradicated by thorough sanitation is proved by the fact that where, as is not unfrequently the case, diphtheria appears in a house separated from others, the attack may be limited to one individual or to only a portion of the household, and, having run its course, will never reappear in that dwelling provided only it be properly 'swept and garnished.'

Not only is diphtheria highly contagious to those in attendance on the stricken patient, but its infecting properties may be retained for months in tainted clothing, dwellings, and apartments.

Sporadic, separate, or solitary cases of diphtheria, without obvious exposure to previous infection, are rare. [10]Huebner's explanation that these cases arise through the influence of cold, inducing spasm of the superficial capillaries of the pharynx, to be followed by complete cessation of the circulation and diphtheritic exudation, is certainly suggestive; but in such a case the hygienic surroundings of the patient must presumably be favourable for

the settling and development of bacterial germs on the exudation or membrane; microbic decomposition and gangrene of the latter, with the production of poisonous chemical excreta, ptomaines, albumens, albumoses, or what not, would, according to this view, explain the occurrence of secondary symptoms and the development of systemic infection. If it could be shown that cases do absolutely arise in this local way, and afterwards develop systemic manifestations, it would go far to prove the correctness of the view of [11]Oertel, [12]Schech, and others, that diphtheria may be in the first instance a local disease.

Chief amongst **insanitary causes** are impurity of drinking-water or of milk (sometimes tainted by dilution with impure water, or by cleansing of the pails with the same), defective sewers, ill-trapped drains leading to escape of sewer gas, soaking of the soil with sewage poison, and, indeed, all those conditions considered as favourable to the development of typhoid. It is held by some as unnecessary that the poison influencing the foregoing circumstances should invariably be that of diphtheria, though in all probability such is generally the case, there existing, it may be, a separate chemical poison, volatile or otherwise, as well as a separate bacterium for each variety of infectious fever.

The contagium remains dormant for weeks or months, and, according to some authors, for even years. Regarding these supposed longer periods of inactivity, the disease is perhaps generated *de novo* in the way previously suggested.

Season.—The disease is certainly more frequent in the winter—particularly in cold damp weather. Epidemic influenza is also a probable predisponent, and generally it may be stated that the atmospheric influences are those favourable to the causation of catarrhal inflammations; but it cannot be denied that diphtheria occurs at any period of the year, and under very varying influences of wind and weather. It is more frequent in temperate than tropical climates. Rural districts are more subject to the disorder than urban, in the proportion, says [13]Thursfield, of three to one.

Incubation.—The experimental incubation period when communicated by inoculation in the lower animals is short, and varies from one to three days. It is said to be about the same period when a human patient is infected by direct contact. In this connection [14]Leslie Phillips reports a very interesting case, in which some of the same instruments were used on the same day, first in the operation for tracheotomy for diphtheria, and secondly for circumcision; the circumcised child had pseudo-membrane on the prepuce on the fourth day. In ordinary circumstances the period

between exposure to the contagion of infected air and the appearance of false membrane is from two to eight days.

Age is an important factor both in the susceptibility and in the gravity of the disease, for while about 10 to 12 per cent. of children die from diphtheria under the age of 1 year, over 33 per cent. are fatally attacked between 1 and 5 years, and about 20 per cent. between 5 and 10 years. Each succeeding decade shows diminution in both liability to contagion and in severity of the attack when manifested.

No doubt an anatomical explanation, viz., the small and chink-like glottis of children, will account in some degree for the high infantile mortality, but it is also probable that their delicate organizations are more affected than in the case of an adult by the virulence of the poison, be it a ptomaine or what not; and I would once again repeat the opinion already frequently expressed, that in young children there is a greater tendency for inflammations of the air-passages to assume an exudative membranous type—thrush, plastic bronchitis, and non-specific membranous laryngitis being diseases almost entirely confined to the period of childhood and adolescence.

Constitution is not thought to play any part as a predisponent generally, but, without doubt, children who are subject to naso-pharyngeal catarrhs are more liable to take diphtheria. Those suffering from a morbid condition of the tonsils are also especially receptive of contagion, for, in fact, the patches nearly always first appear on the faucial tonsils. I have experience of several cases illustrating it from two aspects, namely, some in which removal of the thickened mucous surfaces of enlarged tonsils, and consequent restoration of function, has appeared to give a special immunity to the disease, and others in which my advice as to removal of these glands and accompanying adenoids having been neglected, diphtheria has been specially fatal. It may be remarked, *en passant*, that the same fact holds good in relation to scarlatina.

My advice was sought by my friend Mr. Poyntz Wright, Medical Officer of the St. Neots Local Board of Health, in the case of diphtheria occurring to a member of his own family, a young lady, aged 24, who had been subject to 'ulcerated throat' and lacunar tonsillitis ever since she had scarlatina fifteen years previously. Four days before her attack, the patient had walked across a turnip-field which had recently been flooded. She experienced great nausea from the horrible stench which was exhaled, but continued her walk to a sewage-farm, where she gathered some moss from an osier-bed. On the following day a sharp sickle-shaped herring-bone lodged in the left tonsil, and in her endeavours to extract it broke off short. Sore throat commenced two days later, and on the next—the fifth from her visit to the sewage-farm—membrane appeared. The exudation was strictly limited to the *left* side of the fauces, with the exception of *one small patch* of membrane on the *right* tonsil. On the sixth day there was complete paralysis of

the velum on the left side, with paresis of the muscles on the right. A friend and other children of the same family who had been walking with her on the occasion noted were unattacked; and with the exception of one (doubtful) case of diphtheria ten miles distant, the district was quite free from the disease.

There can be little doubt to my mind that in this case the chronically inflamed condition of the tonsils, and the consequent abeyance of their function of phagocyte-production rendered the patient susceptible to the noxious influence of the probable microbic poison of the decaying turnips, and to possible germ emanations from the osier-bed at the sewage-farm, and that the herring-bone incited to more thorough introduction of the poison. The paralysis supervened the primary manifestation with unusual rapidity.

The following curious circumstance is worth recording in this connection of constitutional predisposition, though it has points of interest which apply to other considerations of etiology; it has also an especial bearing on the ptomaine theory, and on the prophylactic influence of antiseptic measures:

I was asked in July, 1885, to attend a young lady in conjunction with Mr. Henry Bury, of Whetstone. The patient was a tall, well-grown girl of 17, and of good constitution. She resided in the same house as, and was the constant and inseparable companion of, another young lady of the same age, but of delicate health, who had for some years been under my constant care on account of strumous ozæna, for the relief of which she diligently employed antiseptic applications in the shape of sprays, douches, and ointments. There were other cases of diphtheria in the adjoining stables and in the neighbourhood, but the exact cause in the case under notice was believed to be the breathing of exhalations from the stagnant and foul water of a pond where the two girls had been amusing themselves catching tadpoles, etc. Now the stronger of the two had diphtheria very virulently, and the attack was followed by grave and protracted paralyses. The delicate girl who was employing antiseptics had a very high temperature for two or three days, and was prostrated; but she exhibited no throat symptoms nor sequelæ whatever.

This case bears an indirect relation to the factor next to be considered, namely:

Social Status.—Although in its endemic form diphtheria is rarely manifested in the first instance in houses thoroughly efficient in sanitation, it will, when epidemic, rage equally amongst both rich and poor, the delicate and the robust. But it has appeared to me that when diphtheria attacks members of the upper classes, it is often more malignant, and runs a more quickly fatal course than amongst the indigent; the disease finding, as it were, a more receptive soil in the person of those delicately nurtured, than in those whose systems are in a manner accustomed to insanitary influences. On the other hand, and for obvious reasons, recovery from the sequelæ, when once the acuteness of an attack has passed off, is more expeditious and complete in the well-to-do.

PATHOLOGY.—ANATOMICAL CHARACTERS. **Mucous membrane of Throat**, etc.—The primary local manifestation of diphtheria usually appears as an inflammation of the *fauces*, not necessarily uniform, attended with exudation which proceeds in most instances to the formation of false membrane. This surface inflammation of the throat may be somewhat mottled, and is analogous to the ordinary eruption of the exanthemata on the skin; cutaneous rashes are even occasionally observed in diphtheria. The inflammatory redness gradually extends over the entire mucous membrane of the back of the throat, but the deposit may commence at any one spot—in the majority of cases on the *tonsils*—or at several places concurrently, as at the back of the *pharynx*, on the *pillars* of the *fauces*, on the *uvula*, or on some other part of the *velum palati*. Later it may spread to the *larynx*, *trachea*, or *bronchi*, even to the finest ramifications of the latter. Or patches may appear on the mucous membrane of the *buccal cavity*, *lips*, *nose* and *conjunctiva*, these also being late manifestations.

Digestive Tract, etc.—In some *rare* instances it is found on the lining membrane of the *œsophagus*, *stomach*, *intestines*, *rectum*, and even *gall-bladder*. Very exceptionally it starts in, or is limited to, certain of these parts. Specimens illustrating diphtheria of *Peyer's patches* have quite recently been added to the Museum of the College of Surgeons, these lymphoid masses being homologues of the tonsils. I have more than once met with cases of two individuals dwelling in an unsanitary house, the one of whom has had typhoid and the other diphtheritic symptoms. The same observation has been made as regards scarlet fever.

The deposit has been found on the *prepuce* of the male, and *vulvo-vaginal* tract of the opposite sex. Diphtheritic exudation, however, only attacks the *skin* at abraded spots, such as eczematous fissures, operation wounds, leech-bites, and blistered surfaces.

[15] Hill has recently recorded two primary cases of diphtheria of the perineal region which occurred in a father and daughter. The disease was supposed to be contracted through using an unsanitary water-closet. The father, aged 40, had false membrane on an old eczematous patch near the anus, which was followed by typical paralysis. There was no false membrane in the throat. The daughter, aged 9, had some weeks afterwards primary diphtheria on the vulva, which spread to the vagina and perforated the recto-vaginal wall. In this last case there was also false membrane on the throat which extended to the lungs, causing death.

In addition to lesions of mucous membrane, other organs are often profoundly affected.

Lungs. — Pathological lesions in the pulmonary organs, as exudative and other forms of bronchitis, lobar and lobular pneumonia, pulmonary collapse, etc., are due in most cases either to

extension of the membrane from the larynx into the lungs, or to a stenotic condition of the glottis, and as a late feature of the disease we may here mention paralytic engorgement.

Kidneys.—The almost constant symptom of albuminuria points to the fact that the kidney suffers in its endeavour to eliminate the virus. In the early stage of the disease the kidneys are merely in a state of hyperæmia; later on, however, the condition is that of true parenchymatous nephritis, with cloudy swelling, fatty degeneration, and shedding of epithelial cells. These latter, singly, or in the form of casts, together in some instances with blood-corpuscles, speedily make their appearance in the urine. Micrococci and bacteria are occasionally to be found in sections of the renal tissue; but as their presence is not constant, they cannot be regarded as direct excitants of the nephritis.

The lymphatic system is often deeply involved, and the inflammatory enlargement and occasional suppuration of the glands at the angle of the jaw is of diagnostic importance from its almost constant occurrence in pharyngeal diphtheria. Hæmorrhages of the **Spleen** are occasionally observed after death; and exudative milky patches have been recorded as present on its surface, as well as on that of the brain and heart. The proclivity to attack of the lymphoid masses lining the alimentary tract have already been alluded to.

Nervous System.—[16]Buhl found capillary hæmorrhages; and changes in the cells of the neuroglia and in the nuclei of the nerve-sheaths of the spinal cord have been reported in cases which had exhibited paralytic sequelæ.

Heart.—Fatty degeneration is not very frequently observed post mortem, but thrombotic clots in the ventricle, aorta, and pulmonary artery are fairly often seen in those cases which die in the acute stage with marked symptoms of asthenia. Bacilli have been found in the heart muscle in at least one case brought to my knowledge.

Histological Features.—Turning now to the **microscopic** appearances of diphtheritic lesions, it must be admitted at the outset, as mentioned in our remarks on croup, that there is nothing absolutely characteristic or pathognomonic in the exudation patches and false membranes.

There can be little doubt that the same causes which would give rise to inflammation, pustulation, ulceration, and local sloughing or gangrene on the skin, will lead, in the case of mucous tracts, first to hyperæmia and catarrh, then to the formation of the white exudation patch, and lastly to necrosis and

false membrane. During health a mucous membrane secretes a serous fluid containing mucin, and at least some of the fibrin factors; and it is not strange that when such a tract is injured either by the presence of a specific poison or by any of the before-mentioned causes, the catarrhal inflammatory state (consisting principally of cell-proliferation) should be followed, primarily, by mucous and fibrinous degeneration, rather than by fatty changes and suppuration, which are only the last stages of the morbid phenomena. These later changes result from blocking of the vessels and their degeneration, causing first circumferential necrosis, and eventually separation of the so-called false membrane. It is probable that the membranous nature of the lesion is due to a fibrinous coagulation which is caused by the presence of the chemical poisons excreted by the invading organism; if the poisons themselves do not actually cause coagulation of the serum in the tissues, it is conceivable that they may cause disintegration of leucocytes, and thus set free some of the fibrin factors. Until recently it was believed that there was an essential difference in the structure of the false membranes of specific diphtheria and that of non-specific membranous laryngitis. Thus [17]Virchow's views that the exudation or the false membrane of the latter is always superficial to the membrana limitans, whilst that of the former always extends to the deeper layers, have been adopted by [18]Niemeyer, and have been quoted over and over again. That this is not correct has since been admitted by [19]Virchow and by less eminent authors; and we now know and readily understand that there must be an apparent want of similarity between a portion of *pharyngeal* false membrane taken from a case of diphtheria and a portion of *laryngeal* membrane from a case of croup. This, however, is due to the fact that there is a difference in the normal histological structure of the mucous lining of the pharynx and larynx, viz., in the character of the epithelium, in the distribution of the glands, and in the relative amounts of adenoid tissue and lymph-follicles; but there is no *essential* difference between laryngeal false membranes, whether of specific (diphtheritic) or non-specific (croupous) origin. The greater vascular supply, the more serous secretion, and the large amount of adenoid tissue and lymph-follicles in the pharynx, account for the more fibrinous character of the exudation, and for the frequent sub-epithelial cellular infiltration in pharyngeal patches and false membranes.

Under the microscope an ordinary diphtheritic exudation patch, at a stage prior to any naked-eye evidence of even partial detachment, presents pretty constantly two layers, a superficial

and a deep. The former is made up of a number of strata of epithelium cells, evidently consisting of the original epithelium lining, whose cells have, however, undergone proliferation in addition to cloudy swelling, and granular and mucoid degeneration of the cell contents; these latter changes often render the cellular nature of the layer somewhat less obvious on account of the obliteration of the cell outlines, especially in unstained sections.

Beneath the epithelial there is usually a deeper layer, composed of a network of irregularly interlacing fibrillæ, resembling coagulated fibrin, and enclosing leucocytes in its meshes: this fibrinous material often extends into the ducts of the glands. In a recently formed patch beneath this deep layer will usually be found a fairly normal basement membrane; occasionally, however, the lowermost layers of the original stratified epithelium will be seen interposing between the fibrinous layer and the basement membrane. In some older patches, and more particularly in those around which the hyperæmia is of high grade, the deeper mucous and sub-mucous structures present various degrees of inflammation with engorged vessels, and the infiltration of the tissues with leucocytes. In the worst and most advanced cases of false membrane of the pharynx, whether due to diphtheria or as the result of artificial or accidental induction, the infiltration and exudation of fibrinous serum leads to blocking, then to degeneration and necrosis of the circumferential vessels, ending in the formation of a sequestrum or slough. The inflammatory process does not always stop at the submucosa, but may extend to the whole depth of the tissues, involving even the muscular structures of the larynx. Sometimes these various stages are to be detected in different parts of the same throat;

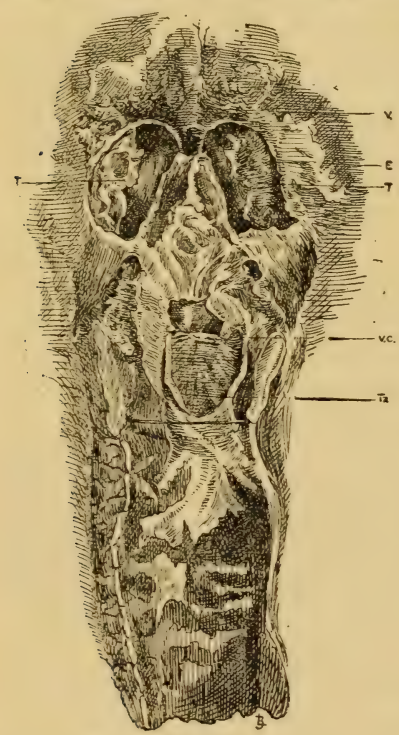

FIG. CXXXIII.—POST-MORTEM APPEARANCE OF THROAT, LARYNX, AND TRACHEA AFFECTED WITH DIPHTHERIA (OPENED FROM BEHIND).

V. Posterior surface of velum palati.
T. Tonsils.
E. Epiglottis.
V.C. Vocal cords.
TR. Trachea.

the colour and appearance of any particular patch enabling us roughly to form an opinion of its age, depth, character, etc. Fig. CXXXIII., which is also reproduced in colour as Fig. 117 on PLATE XIV., well illustrates the naked-eye appearances of the exudation at different situations. The specimen was taken from a child, aged 4 years.

Renshaw's experiments point to the fact that there is probably some relation between the age and the colour of the membrane and its *relative contagiousness;* it is possible that this may be in some way connected with the stage of germination of the vegetable organisms, and perhaps with the later production of poisonous ptomaines and albumins.

SYMPTOMS: A. FUNCTIONAL.—Diphtheria is in most cases ushered in by general constitutional symptoms after a variable *incubation* period of from one to three or four days; exceptionally it may be limited to a few hours, or prolonged to a week or more, and the interval has been extended by some authors to even three or four weeks. The *invasion* is usually gradual in adults and older children, but may be quite sudden in infants; it is rarely marked by rigors in children, as mentioned by Schech, for such a circumstance is as unusual in this as in any other disease of childhood; but prodromal symptoms of malaise are quickly followed by a certain amount of pyrexia, with headache, drowsiness, thirst, vomiting, and diarrhœa; at the same time there is often stiff neck, pain at the angle of the jaw, and more or less sore throat. About this time erythematous cutaneous eruptions occasionally make their appearance, and often obscure the diagnosis. Within a few hours of these first symptoms of fever, or exceptionally after a longer time, the special local manifestations in the **pharynx** become obvious, as evidenced by **pain** in the throat, especially on swallowing, and a feeling of dryness and desire to hawk and clear the fauces. The **voice** is distinctly rough and hoarse before the larynx is affected, but when the disease has spread to this situation the hoarseness is much increased, and in some instances all vocal tone is lost; there is also a laryngeal **cough**, noisy stridor, and **dyspnœa**, due to obstruction, with paroxysmal exacerbations of true spasm.

Laryngeal symptoms, should the disease spread downwards, set in from the third to the eighth day, and are *invariably* ushered in by a rise of temperature, which is often considerable, and sometimes by vomiting. In laryngo-tracheal diphtheria of children, the noisy, whistling, stertorous breathing, and other indications of obstructed respiration, make their appearance early; there is

sinking in of the lower part of the thorax, the larynx is drawn down during inspiration, and the accessory muscles of respiration come into play. As the chink of the glottis gets narrowed by the increase in area and in thickness of the deposit, the choking and asphyxiating paroxysms will become frequent; the little patient, after exhibiting more and more restlessness, will throw its arms about and clutch at the throat. The period of commencing cyanosis, which follows, is one of comparative repose, and is accompanied by cold sweats, blueness of the ears and extremities, and a fall of temperature. The gradually increasing carbonic acid poisoning produces first apathy, then somnolence, later coma, and finally death in from twelve to thirty hours. In adults, for obvious anatomical reasons, a circumscribed patch in the larynx rarely causes dyspnœa; in such cases, however, extension downwards may take place, leading to bronchitis and lobular pneumonia, with later symptoms somewhat resembling those above described.

When the **nose** is implicated, its normal functions are interfered with, and fluids often escape during swallowing, from the palatal muscles being affected; there is nasal discharge of a peculiarly fetid and sanious character, and sometimes **epistaxis**, this latter being a very grave symptom.

In the most malignant forms of diphtheria the symptoms often assume an asthenic or typhoid character from the beginning. Such cases sometimes die quite suddenly; in others the patient is attacked by unexpected and oppressive palpitation, to be followed by great prostration, cyanosis, and death in a few hours. The pathology of such is probably very varied, but they are often associated with either thrombosis of the ventricle and pulmonary artery, or with acute inflammation and fatty degeneration, and possibly with microbic invasion, of the heart-muscle; or with a paretic condition of the cardiac nerves; this last being due, possibly, to the action of a ptomaine.

If the **stomach** and **intestines** are involved, corresponding local symptoms will be observed. The lesion is usually found to arise in Peyer's patches—the *intestinal tonsils*, in fact.

A case of diphtheric enteritis came under my observation in the year 1884. The patient, a general practitioner, was attacked with all the symptoms of intestinal obstruction whilst actively engaged in attending a large number of cases of epidemic diphtheria; marked asthenia was exhibited early in the disease, and the illness terminated in death from perforation and fæcal escape into the peritoneal cavity. At the post-mortem examination several diphtheritic patches and ulcers were found in the small and large intestines. The real nature of the case was quite unsuspected till the autopsy revealed it.

During the epidemic of diphtheria at Ealing in 1887, two cases came under my notice of sisters who, with others, were attacked in a school. One had, in common with other pupils, pharyngo-laryngeal diphtheria from which she recovered; the other had no throat symptoms, but died of perforative peritonitis—the result of diphtheritic enteritis.

Some perversion of function of the special senses of **smell**, **taste**, and **hearing** will generally be found if carefully looked for. The **odour** of the breath is always tainted, and in malignant cases is so extremely offensive that no caution is needed to be given to the attendants to be careful not to inhale it. The progressive paralyses we shall allude to under the head of Sequelæ.

B. Physical Signs.—These have mostly been either already described under Pathology, or incidentally alluded to under the preceding heading. A brief recapitulation will suffice here.

Pharynx (Fig. 42, Plate V.).—The fauces, at first red, will soon become the seat of exudation patches, which can be observed to increase in thickness, to become tougher in consistence, and to extend, sometimes quite rapidly, in area. Their colour, from a pellucid white or hoar-frost appearance, will gradually assume a yellow, dirty brown, grey, and greyish-black hue. The yellowish chamois-leather colour is often first formed at the edge of the patch. If exfoliation takes place, or if the pseudo-membrane is artificially removed, either a slightly eroded granular surface, or else a raw and hæmorrhagic one, is seen. This condition, however, soon gives place to a fresh exudation. Even when patches do not exist on the palate, it will be observed to be changed in colour, which varies from a livid purple to a dusky grey tinge. In many of these cases use of the rhinal mirror will reveal patches on the posterior surface of the soft palate and uvula. The fact of an exudation on the uvula, and especially on its posterior surface, is regarded by me as a point of almost pathognomonic importance. If the naso-pharynx is much blocked by adenoids, the gravity of the prognosis will be increased; but it may be modified by adoption of operative measures, for subsequent formation or re-deposit of membrane is not worse than post-nasal stenosis during an attack.

Examination of the **nose** (Fig. 43, Plate V.), after a post-nasal douche of warm-water, will usually exhibit much the same surface conditions of colour. If there are distinct patches on the nasal mucous membrane, they will probably be present on the superior surface of the palate; also the palatal muscles will be early paralyzed in those cases in which there is both anterior and posterior palatal exudation, this same palsy explaining the regurgitation of fluids through the nares, so common when the nose is implicated by the exudation. The discharge from the nostrils in nasal diphtheria is peculiarly offensive and irritating to the skin, which, by contact around the alæ and upper lip, becomes inflamed, raw and eczematous. Patches of membrane may also be exceptionally seen on the inside of the cheeks, lips, or on the conjunctiva.

If the **larynx** (Fig. 55, PLATE VI.), is implicated the fact is usually rendered evident by the symptoms previously enumerated, as well as by portions of membrane being coughed up; these expectorated fragments are often of considerable size, and sometimes form complete casts of the parts from which they have become detached. Only a satisfactory laryngoscopic examination, however, can give us an adequate idea of the extent of surface involved. I cannot recall, as a matter of fact, that there is any special portion of the larynx more prone than another to the membranous exudation, though in all probability the same law which obtains with regard to the greater liability to other forms of inflammation of those portions in which the mucous membrane is loosely attached, would hold good in the case of diphtheria.

C. MISCELLANEOUS.—In addition to the foregoing signs, functional and physical, all other symptoms point to the presence of a disease of an extremely depressing nature.

Although presenting all the surface indications characteristic of an infectious fever, there is nothing very distinctive of diphtheria in the **tongue**; it is foul and loaded from the first, and in unfavourable circumstances, as the disease advances, is harsh and dry and covered with thick dark fur.

The **pulse**, rapid from the commencement, is small and feeble; in this respect differing from that of croup. Intermission in the beat will indicate cardiac failure, and diminution in frequency below the normal, with a corresponding decrease of power, will be witnessed when death is approaching from general exhaustion. It is also to be remembered that depression of the pulse during inspiration is a sign of laryngeal stenosis. One of the first signs of recovery will be diminution in frequency and gain in volume.

The **thermometer** gives indications of the first importance in diphtheria, and there are few diseases in which it affords greater aid, albeit the variations are not always very extreme. As a rule, an increase may be taken to point to a further extension or complication, and reduction within certain limits is usually a sign of improvement. Commencing with a more or less rapid rise to 102° or 103° F., the temperature is immediately lowered on appearance of false membrane on the pharynx, and may become even subnormal. Then, at a period varying from the third to the sixth day, there will again be a rise. This gives intimation either that the larynx is becoming involved, or, other things being favourable, may be due to occurrence of suppuration at the base of the pharyngeal exudations prior to their separation. A further rise may give warning of a nephritis or pneumonia, while a serious

fall at this stage below the normal will be an unfailing evidence of decrease of vital power, and will prognosticate death by asthenia.

In very young children, sudden rises in the temperature are not always indicative of such grave changes as in the case of adults, agreeing in this respect with our thermometric experience in other infantile maladies.

Enlarged glands in the neighbourhood of the throat and neck, especially at the angle of the jaw, will nearly always be found. The parotid and submaxillary are sometimes the seat of considerable inflammation.

Auscultation of the **heart** and **lungs**, which should be made at least once daily, since by such means only is early warning of thoracic complications to be ensured. In a case to be presently narrated, Cheyne-Stokes respiration was found to be due to nasal obstruction, and not to organic mischief.

A physical and chemical examination of the **urine** should never be omitted, albumen, casts and blood being especially sought for. **Uræmic** symptoms occasionally occur, more especially in young children when the nephritis is severe. Nausea, continued vomiting, loss of appetite, frequent pulse, drowsiness, somnolence, occasionally eclampsia, coma and cardiac failure, clearly indicate the onset of this grave complication. The only thing with which it is likely to be confounded at an early stage is commencing septicæmia, but the thermometer will aid in settling this question.

VARIETIES OF DIPHTHERIA.—[20]Wagner, [21]Jenner and others, have described different forms of diphtheria ; with all deference to such eminent authorities, I cannot admit that such classifications are either logical or satisfactory, whether made on anatomical or on clinical grounds, or on a consideration of both together ; for at no period during the course of any so-called variety can it be prognosticated that it will not later assume the characters of some other form. Thus, as in other specific fevers, the symptoms are sometimes so *mild* that the disease escapes recognition. This is the diphtheritic sore throat and tonsillitis which is usually met with during epidemics in adults attending on cases of diphtheria, and is sometimes considered as *catarrhal*. There may be little pyrexia, and that of short duration, and no albuminuria ; in some instances there may be no sequelæ ; in others these will be well marked, and will give the first indications of the nature of the disease. Cases of this kind will be recalled to the memory of every practitioner. On the other hand, a case commencing as a mild one may take on a highly *inflammatory* and *malignant* type, with hyperpyrexia and excessive exudation, the disease running to a

quickly fatal issue; or the symptoms may assume a low, *asthenic* form from the commencement, and ultimately *typhoid* symptoms may set in.

Complications and Sequelæ.—An ordinary case of diphtheria lasts from a few days to a fortnight or more, but complications may very much prolong the duration of the attack. The chief amongst these are alarming and often fatal cardiac failure, acute pulmonary diseases, excessive albuminuria, and hæmorrhages from the nose, pharynx, air-passages, and other parts. Asthenia, anæmia, and slight albuminuria may last a considerable time.

Of all the sequelæ the most interesting are those connected with the nervous system. **Diphtheritic paralysis** is both motor and sensory, and is progressive in character. Paresis or paralysis of motion and sensation of the soft palate is usually the first symptom. Loss of ocular accommodation from implication of the ciliary muscle quickly follows. The tongue, lips, and cheeks are then generally involved, the paralysis extending even to the pharyngeal muscles. Still later the muscles of the extremities and of the trunk suffer. Peculiar sensations of tingling and numbness indicate commencing implications of the limbs.

It frequently happens that whilst parts supplied by one set of nerves are becoming functionless, others previously attacked are progressing towards recovery.

This was well exemplified in a case which was brought to my notice of a child who had first, diaphragmatic paralysis along with paresis of the upper extremities from implication of the cervical nerves; later on intercostal breathing became impaired, but by this time the diaphragm had resumed work.

Differential Diagnosis.—There will be less difficulty in recognising this disease in its epidemic form than in isolated cases. The pharyngeal patches may be confounded with aphtha or herpes, with simple membranous inflammation, whether idiopathic or traumatic, with exudative lacunar tonsillitis, with syphilis, with phlegmonous pharyngitis due to erysipelas or septic causes, with scarlatina and other constitutional fevers.

The history and subsequent rapid progress of the case, the temperature chart and the condition of the urine, will usually clear up the diagnosis. The thermometer is here of the greatest value. The temperature is usually high in *tonsillitis*, but it rapidly falls, especially in the rheumatic variety, on the appearance of the lacunar exudation or on formation of pus. Many a case of diphtheria is at its commencement diagnosed as a tonsillitis; possibly the opposite may also occasionally occur; and it is worthy of remark that in addition to the test of the thermo-

meter, the great pain and difficulty in opening the mouth so characteristic of the milder malady will materially assist to a correct recognition of the nature of the case. In *scarlet fever* the temperature is always high, 103° to 105° F., and remains so for some days. In diphtheria the thermometer rarely records a higher temperature than 101° or 102°, and never a continuously high one; but, as already stated, it is characterized rather by a series of elevations and depressions coincident with extension of the disease and fresh complications.

The physical test *par excellence* is that whereas the so-called exudation of *lacunar tonsillitis* can be easily brushed away without denudation of the epithelium, in *diphtheria* some force is required for removal of the membrane, and a bleeding surface, indicating invasion of the mucous membrane, is exposed. In *mycosis tonsillaris* I have occasionally seen small hæmorrhagic points after detachment of the fungoid growth; *quite different*, however, from the raw surface of diphtheria, and with appropriate treatment there is no re-deposit.

With *aphtha* and *herpes*, diphtheria will rarely be confounded even by the tyro after the second visit. As to *membranous sore throat*, apart from membranous laryngitis I do not recognise such a disease uncomplicated by specific influences of constitution or hygiene. In *pharyngeal erysipelas*, which includes the *septic sore throat* of some authors, the temperature is higher; there is always great distress; the tissues are very œdematous and livid, and the cutaneous surface of the neck is usually also involved.

In its anatomical seat, essential histological structure, and in *some* of its clinical characters, *laryngo-tracheal diphtheria* presents a remarkable resemblance to *membranous croup;* so much so, that many specialists regard the two diseases as identical. In the former editions of this work I combated this view at some length. Further experience and observation have only tended to strengthen the opinion I have always held, namely, that the membranous croup of children is a non-specific disease of the larynx and trachea, bearing a close relationship to œdematous laryngitis of adults, but etiologically and in some points clinically distinct from the highly infectious and specific malady, diphtheria, which very rarely originates in the larynx or trachea, and may terminate fatally without extension to those parts. The analogy between the two diseases is much the same as that between enteritis and enteric fever, ordinary pneumonia and the septic or typhoid variety, local traumatic erysipelas and the malignant infectious form. Membranous croup is sporadic and non-inoculable; it

attacks children, rarely youths, and never adults. It is not infectious; the exudation is the essential feature in causing death by mechanical obstruction. The glandular swelling in the neck, so universal in diphtheria, is not present in the non-specific disease. It is sthenic rather than asthenic in its features. The pulse is hard and strong in most cases. In croup the urine rarely contains albumen, and paralytic sequelæ are absent. Lowering remedies are well borne. Attention to these facts will usually enable one to diagnose between a case of membranous laryngitis which is characterized by the foregoing symptoms, and a solitary case of laryngo-tracheal diphtheria.

The [22]Scientific Committee appointed by the Royal Medico-Chirurgical Society to inquire into the relations of membranous croup and diphtheria, collected a mass of highly interesting matter, embracing hospital statistics and the private records and opinions of general physicians and practitioners. The main conclusions arrived at by the Committee were that 'membranous affection of the larynx may arise in connection with common inflammation or with specific disorders of several kinds, the most common of which in this relation is that which produces similar change elsewhere, and which is recognised as diphtheria. In the larger number of cases of membranous affection of the larynx the cause is obscure (*i.e.*, in any given case it is difficult to predicate the particular cause in that case). Amongst those in which it is apparent, common irritation seldom presents itself as a source of the disease; accidental injury is but very infrequently productive of it. But few cases of undoubted origin from exposure to cold are on record. On the other hand, in a very large number of cases infective or zymotic influence is to be traced.' I have quoted the exact words of this Report, because, notwithstanding the fact that the Committee were evidently in favour of considering laryngo-tracheal diphtheria and membranous laryngitis as identical, careful perusal of the whole document brings out very strongly the fact that a large majority of those who contributed to the investigation by answering the Committee's circular of questions, were so clear in their opinion that non-specific membranous laryngitis exists (and is fairly frequently met with in practice) as quite a distinct disease from primary laryngo-tracheal diphtheria, that it was impossible for the Committee to speak more definitely. I feel constrained to add that, in my judgment, some of the Committee's conclusions, notably those regarding the influence of cold *per se* to produce croup, and on the question of contagion, are in direct contradiction of the evidence which they publish.

Prognosis, Course, and Termination.—The forecast of diphtheria must always be very grave, and though undoubtedly many recoveries take place, complications are so numerous and serious that it is almost impossible to predict a successful issue from any case, however mild at its commencement, until restoration to health is so far advanced that the practitioner feels he can dismiss the patient from his care. When death results it may occur within twelve hours of the first manifestation of membrane in the larynx, and, according to Jenner, is never delayed beyond the fifth day from that event. Between such an early termination, due to laryngeal extension, the time at which the fatal issue may take place varies from one to five or six weeks. After tracheotomy the same uncertainty prevails, and death may occur by a sudden attack of cardiac or respiratory failure even when all appears to be going well. As in croup, age is a very important element in the formation of prognosis, and the younger the patient the less likely is the issue to be favourable. The course of the case towards recovery or death will depend more or less on the following points: The character of the epidemic and hygienic surroundings already detailed in our remarks on etiology; the site and amount of deposit —whenever the nose, larynx, or intestines are involved, the issue is always grave; aural pain due to extension from the throat to the middle ear, and great pain in the throat from glandular enlargement, are also symptoms of unfavourable significance. Obstructions to respiration in the nose, naso-pharynx, and fauces from tonsillar enlargements are factors of the gravest danger. Ecchymoses, epistaxis and other hæmorrhages, and purpuric spots, likewise indicate serious complications. Asthenia and cardiac failure, typhoid, septicæmic, uræmic, or other low constitutional states, render the chance of recovery doubtful.

It cannot too strongly be enforced that the condition of the renal secretion should also be carefully watched for the presence of excessive albumen, casts, and blood, because on the knowledge gained by such examination our judgment as to the course will be materially influenced. Suppression of urine is a precursor of a fatal issue. Persistent anorexia, vomiting, and diarrhœa tend to lower the patient and endanger life; and these symptoms may be present in a marked degree without the intestines being attacked by deposit. When this latter condition exists there is usually constipation, with vomiting, which after a time becomes fæcal. The gravity of lung complications will depend not only on the nature of the pulmonary disease and amount of tissue involved, but also on the condition of the larynx and general state of the patient.

There is no necessity to recapitulate the various modes in which death may be brought about. Suffice it to say that all those primary causes which are enumerated in our remarks on croup equally apply to this disease; and, in addition, there is fear of the many secondary complications which we have repeatedly indicated. Recovery after tracheotomy is naturally much less certain when performed for diphtheria than for the non-specific inflammation. When the tendency is to recovery there is a gradual abatement of the functional symptoms, of which the temperature and especially the pulse are the first to give indication of improvement. Respiration and articulation will next be favourably affected as the membrane is separated and the inflammation subsides. Relief of pain in the neck and throat generally will also be experienced as the glandular enlargement is lessened; but the difficulty of swallowing may become even worse rather than better, as ulcers are exposed on separation of the membrane, or when, as not unfrequently occurs, paralytic sequelæ follow closely on the acute attack. This last circumstance may also give rise to characteristic and increased impairment of the voice. These nervous sequelæ usually terminate favourably, but much will depend on the extent and site of the paralyses. Exceptionally the whole constitution of the patient may be undermined to such a degree that for the remainder of life the effect of an attack will from time to time be manifested. In others it may be years before the baneful influence is finally eradicated.

Recurrence.—One attack of diphtheria, like erysipelas, is generally believed not to protect against a second, and is even held by many to predispose towards the latter. [23]Jacobi actually thinks that patients during convalescence are sometimes reinfected, but then he considers that many of the cases of so-called follicular tonsillitis and 'herpetic angina' of the French are nothing but diphtheria. I cannot personally recall a single instance of well-authenticated recurrence, but since these views in favour of second attacks are held by observers of high authority, I give them precedence to the negative evidence of my own experience.

Treatment.—Prescriptions for both constitutional and local measures for the cure of diphtheria have been even more varied and more numerous than the views which have from time to time prevailed as to the character of the systemic disorder—believed by some to be the cause, by others the result, of the diphtheritic contagium.

Their very variety and multiplicity, not to say their frequently

mutual incompatibility, have only served to show how unstable and unsatisfactory—even up to the present day—are the scientific foundations of the therapeutics of this disease; for hardly a week passes without 'bold advertisement' of a new, general, or topical *specific* for diphtheria.

Since it would be manifestly impossible in the limits of this treatise to discuss the merits of all, I propose to pass in review the most noteworthy and more generally accepted remedial measures, not hesitating to state plainly objections where I differ from the views of others, however established their authority, nor to indicate with equal directness what is my own practice when called upon to advise in any of the various contingencies of an ordinary or an extreme case.

Remedies for this disease, as for all others, require to be considered as (1) Internal or general; (2) Local; (3) Dietetic; (4) Operative; and (5) Hygienic and prophylactic. Each of these main divisions is capable of being discussed under several sub-headings, as will presently appear.

1. Of **general** or **internal** remedies of the nature of drugs, it is probable that none are of really more special use in diphtheria than are those advised for any other acute infectious disorder; and while many practitioners pin their faith to one remedy, or one combination of remedies, others consider it more rational in theory, and more satisfactory in practice, to administer to symptoms as they may arise, having always in view the paramount necessity for recuperative measures.

Of one thing I am assured—namely, that when an author states that this or that remedy is a specific, and that he has never lost a case, the diagnosis has been frequently faulty. I have often been placed in the difficult position of having to point out to a medical man, who had called me in consultation to a supposed case of diphtheria, that the disease under consideration was really either lacunar tonsillitis, mycosis tonsillaris, or septic sore throat, and it is more than probable that many cases reported as instances of recurrent diphtheria have been of this nature.

Probably few practitioners would nowadays give mercury to salivation, or submit a patient to systematic mercurial inunction; but there is much to be said in favour of the administration of one or more moderate doses of calomel and James's powder. And Jenner's practice to commence with a purge commends itself to all, except those modern pharmacologists who ignore the importance of clear *primæ viæ*.

Treatment by *emetics*, whether as mild as alum or ipecacuanha,

or as energetic as antimony, zinc, copper, or apo-morphia, is a course not to be recommended, and except in the very earliest stages must be unconditionally condemned, though no less eminent a physician than [24]Fagge advises that 'when diphtheria attacks the larynx, the treatment must be exactly such as would be employed in the more advanced stages of croup. An emetic of ipecacuanha or of sulphate of copper should be given; and if a good result is obtained, it may be repeated at an interval of some hours.'

Independently of the belief that the amount of assistance given by emetics in the release of laryngeal exudation is somewhat exaggerated, I cannot, looking to the general asthenic nature of diphtheria, assent to their use at so late a period as that of laryngeal extension. It has, moreover, been conclusively shown that forcible separation of the membrane—unless the denuded surface be immediately medicated with a germicide—is a harmful proceeding, because not only is the membrane re-formed, but because thereby the micrococci—which, in point of fact, develop on the most superficial layers of the membrane—are enabled to pass readily through the irritated and bleeding surfaces into the blood-vessels and deeper tissues. It is for this same reason that external blisters are contra-indicated.

On account of the danger of depressant drugs, I would not advise either internal or hypodermic administration of pilocarpine or other agent which should produce profuse *diaphoresis* at any stage, as has been practised, and with report of good results, by several Continental practitioners. [25]Oertel especially recommends pilocarpine in the belief that it hastens separation through 'the mechanical raising of the membranes by exciting increased secretion of mucus.' He administers from 0·01 to 0·05 gramme of *pilocarpinum muriaticum* dissolved in water, either at one time or at short intervals; or in adults, especially when the morbid process has existed already several days, he makes subcutaneous injection of from 0·001 to 0·002 gramme.

While having but little experience of the efficiency of *expectorants*, I venture to think they are prescribed on an entirely false conception of the nature of the malady; and though I have read of the administration of chloride of ammonium, of senega, and of sanguinaria, I have not yet met the practitioner who considers that these remedies are of special or material service in the disease under consideration.

Cubebs and copaiba, which would also come under the head of expectorants, were first recommended as *specifics* ten years ago

by [26]Trideau, who prescribed them in very large doses. They are also advocated by [27]Beverley Robinson, and other competent practitioners; but of their utility in diphtheria I am unable to personally testify.

Of other *specifics*, the majority have been given for their *germicide* or *antiseptic* action; and of this class those most in repute have been the sulpho-carbolates recommended by [28]Sansom, sulphites of soda and potassium, carbolic acid, salicylic acid and the salicylates, and the chlorates and benzoates of potash and soda, some of the latter acting also as *antipyretics*. [29]Fontaine has given sulphide of calcium with the view of destroying the germs and splitting up the toxic alkaloids by means of the generation in the stomach of sulphuretted hydrogen. Probably with the intent of converting these alkaloids into insoluble compounds with mercury, the bin-iodide has lately been advocated by [30]Stepp, and is much employed by others. It probably acts in the same way as in syphilis. Iodide of potassium is also advised, for the purpose of introduction of the iodine into 'the blood and other liquid elements, and into glands, where it amalgamates with albuminoid molecules, and possibly with the bacteria; in any case, it sterilizes media in which bacteria develop.' Of remedies likewise considered specific and acting variously, according to the views of their advocates, as *germicides*, as *alteratives*, and even as *tonics*, are minute doses of the bi-cyanide and perchloride of mercury and quinine. Of *tonics*, *recuperatives*, and *analeptics* may also be mentioned quinine, iron, strychnia, and cinchona.

Probably the internal treatment almost universally held in favour by modern practitioners, is a combination of the antiseptic or antipyretic with tonics. Chlorate of potash with perchloride of iron heads the list in general esteem, though the former is to be given with caution in view of its power to aggravate a tendency to nephritis.

Personally, I do not largely prescribe iron or quinine in the early stages of diphtheria, since I have thought there is frequently a difficulty in their assimilation, and especially of the large doses in which iron is prescribed. Further, all who have experience with regard to iron in this disease will agree with [31]Rose-Cormack that though it has 'a decidedly beneficial action under certain circumstances, it neither arrests nor modifies the character of the malady in its early and most perilous stages; but its utility is unquestionable as an adjuvant, when in the natural course of the disease a spontaneous curative tendency has begun to manifest itself.'

Being an adherent of the view that micro-organisms are not the only factors in contagious processes, and holding that the virus is quite as much a chemical one, and for the most part of an alkaloidal constitution, my treatment naturally aims at :

I. By internal remedies aiding the system in the elimination of the chemical virus by the ordinary *excretory channels*—skin, bowels, kidneys, lungs, etc.

II. Directly attacking the chemical virus circulating in the blood by bringing about such a chemical decomposition as will split up the toxic alkaloids into less poisonous compounds.

III. Combating the poisonous effects of the virus on the system by treating fever, cardiac depression, and other constitutional symptoms as they arise.

IV. Annihilating micro-organisms by germicides locally and systemically administered.

V. Sustaining the vital powers by appropriate diet, including ozonic, oxygenated, and germicidal drinks.

VI. Adopting such mechanical and operative treatment as will enable the patient to breathe freely and to swallow nutriment.

VII. Artificially modifying the atmospheric conditions of the sick-room to meet the needs of each individual case.

VIII. Adopting appropriate prophylactic and hygienic measures.

Proceeding to details, after the purge before recommended, or one or two doses of the mercurial and antimonial alterative, I used to begin with a mixture (Form. 98) containing remedies in combination, with a threefold intention—namely, by means of salicylate of soda, I strove to reduce general pyrexia and local inflammation ; to this was added chlorate of sodium, for the purpose of generating oxygen without depression ; and lastly these were administered in a medium of decoction of cinchona, which has not only a certain germicidal action, but constitutes a tonic more easily assimilated than in its alkaloidal form as quinine. The soda salts are always to be preferred to those of potash in this and all diseases manifesting symptoms of depression ; the salicylate is to be given in very moderate doses, and must be omitted should there be any symptom of cardiac complication. I only resorted to more powerful tonics such as iron in the later possible eventuality of symptoms of extensive systemic infection, depression, and exhaustion. Such a treatment was often sufficient for mild cases, and, so far as the pyrexia is concerned, the value of salicylic acid in alkaline solutions, or of antipyrin and antifebrin, is not to be ignored ; but the almost irresistible evidence in favour of the view that diphtheria, though in the first

instance a local disease, is speedily associated with the presence of poisonous alkaloids in the system, indicates the administration of a drug that shall form insoluble and therefore inert chemical compounds with these toxic agents. This we possess in biniodide of mercury, which should be given in adult doses of $\frac{1}{12}$ to $\frac{1}{4}$ of a grain; in young children of one year old and upwards I give $\frac{1}{30}$ to $\frac{1}{10}$ of a grain, according to age. I prefer the smaller doses, frequently repeated, and I am in the habit of combining a small quantity of ipecacuanha. Probably the success which has attended the treatment of diphtheria by cyanide of mercury, so long in vogue with the homœopaths, can be explained by a similar action on the alkaloids.

There is doubtless quite as much harm effected by the undue pushing of analeptic and stimulant remedies at early stages as in the opposite plan of depressing by drugs, which promote profuse emesis or diaphoresis; and what is said here as to drugs will equally apply to alcohol. While its use is not advised in the early stages, it is not to be withheld or stinted whenever the pulse gives indications of cardiac enfeeblement.

It would be travelling too far beyond the realm of the specialist to enter into the treatment of each possible complication; but a word or two may be said on that of paralytic *sequelæ*.

For these conditions the phosphates of iron, quinine, and strychnia should be administered perseveringly; and so soon as there is reduction of inflammation, electricity either in the induced or constant form, as indicated by the reactions, is to be employed. Strychnia has been advantageously employed by me hypodermically in cases not yielding to electrical measures. Friction and massage, with hot and cold douches, are also of service.

2. **Local** remedies for diphtheria are even more numerous than the constitutional, and the local treatment of this disease was the first subject selected for discussion in the sub-section of laryngology at the meeting of the International Medical Congress in London in 1881. Whether diphtheria be or be not considered as a primarily local affection, there can be no doubt that much of its danger depends on the localization of the lesion in the throat; and the importance of efficient topical measures must therefore be recognised to the fullest extent.

Local remedies are to be divided into internal and external. Of the former, *solvents* of the membrane come first on the list, and to this form of treatment I have given much attention, and have made repeated experiments with some of the different fluids which have from time to time been recommended. As a result, I have

found that though no chemical agent possesses the property of effecting any actual solution of the membrane, an alteration in its character does appear to ensue. Membrane macerated in pure *lactic acid*, undiluted, became soft, translucent, and jelly-like. Pieces of exudation from the same subject similarly treated in *lime-water* were rendered more friable, but no thinner; and this molecular change was more perceptible with *saccharated lime-water*. The solutions were raised to boiling-heat, and lowered to freezing-point; but the experiments were not affected by the temperature of the fluid employed. Taking into consideration the fact that one cannot apply such solutions quite undiluted in the throat—that one cannot exclude air, even with all the balsamic application in the world, especially when laid over a moist surface—that one cannot obtain a direct temperature influence either with steam inhalation or by sucking ice to anything like the degree that was obtained in these experiments, I came to the conclusion, fully borne out by my clinical experience, that these fluids possess no solvent properties whatever, but that lactic acid, not diluted to the high extent hitherto in use, but applied pure by the surgeon at least once or twice a day, and only moderately diluted—say 1 to 6—every two or three hours by the nurse, has some considerable influence in loosening the molecular cohesion of its particles in a manner more favourable to separation than lime solutions, which appear to me quite valueless. In this last opinion, I am glad to have the support of so high an authority as [32]Tobold. [33]Cohen administers, instead of lime-water, inhalations of the former from lime in the process of slacking every second hour, hour, or half-hour; and if that does not appear to suit the case, he substitutes inhalations of the warm spray of bromine; and these failing, he recommends that the sulphurous acid spray should be tried. Cohen does not assert that the lime acts chemically on the membranes, and thinks it merely wedges them up mechanically here and there, permitting better access of the aqueous vapour; but that it acts beneficially in forcing the expulsion of shreds of membrane, casts, and the like, he has no doubt. It is only right to add that he admits that 'this treatment is likely to induce capillary bronchitis, or even pneumonia . . . . but that is a secondary matter to be attended to subsequently.' Of other applications having repute as *solvents*, may be mentioned the *tincture of perchloride of iron*, solutions of *chloral hydrate* and *carbolic acid*, *papaine*, and *resorcin*. As to *iron*, Cohen draws attention to the fact that 'aqueous solutions of iron are not as useful as the tincture; and this

leads to the inquiry whether its local action may be in any measure due to the alcohol,' by its destructive action on the bacteria, and, it may be added, by shrivelling and detaching the membrane through abstraction of the elements of water; but it is now clearly understood that alcohol possesses no germicidal properties whatever. It arrests development of germs, but does not destroy them. It is possible also that the free *hydrochloric acid* contained may have a beneficial action, since this agent was at one time held in repute as a caustic and solvent, and is even still employed. Lastly, the iron itself may act constitutionally as well as locally. But I have satisfied myself by experiment that membrane macerated in the iron tincture undergoes no disintegrating change, but is rather toughened than otherwise by such a procedure. With regard to *chloral*, which is highly esteemed by my former teacher, Mr. Hughes Hemming, of Kimbolton, its value in allaying convulsive and asthmatic conditions generally, renders it probable that this drug also acts generally as well as locally. The same may be said of *carbolic acid*, which has no solvent action on diphtheritic membrane when employed experimentally on removed portions. As a germicide, carbolic acid and the carbolates occupy a much lower position in the scale than was formerly ascribed to them. *Sulphurous acid* has given good results, and is indicated for the twofold reason that it is an efficient germicide, and that it acts both systemically as well as locally. *Papaine* and *resorcin* are said to act very efficiently as solvents; but experiments that I have made lead me to think that their solvent action is but feeble. The preparation of papaine that I have used has been that of Finckler, but quite lately the result of a trial with Christy's papaine inclines me to hope for more satisfactory results.

[34]Oertel, likewise a firm believer in the local and parasitic origin of diphtheria, considers that 'we possess in carbolic acid, though not a specific, yet a most efficient remedy. To produce its *antiseptic* and *antiparasitic* effect, we must employ more concentrated solutions than have been used heretofore.' He recommends 'for local action on diphtherial mucous membranes 5 per cent. solutions, nebulized by means of a steam apparatus, and inhaled by the patient every two or three hours, and even oftener, for from two to five minutes, according to the severity of the case and the age of the patient.'

I am quite in accord with those who consider that *caustics* are harmful—chiefly because of their liability to injure contiguous healthy tissue — though [35]Bloebaum of Coblentz has

reported successful results from galvano-caustic applications, made in the belief that they destroy micro-organisms, which, with probable correctness, he holds to be the primary cause of the disease. I agree also with those who think that mere *astringents* are useless. The *chlorides* and *sulphates of zinc*, *alum*, etc., have no germicidal or solvent action of sufficient potency. *Alkaline* solutions, as of *bicarbonate of potash or soda*, are advocated by Schech as solvents. As such they have no power, but they doubtless neutralize the acid poisons generated by the life-processes of the micro-organisms.

Truth to say, I am so well satisfied with **lactic acid** that I have been loth to try any other local remedy. I may add that I have not found it injurious to contiguous healthy tissues, that is to say, wherever the epithelial layer is entire. In this respect, it is preferable to hydrochloric acid, while it is even more efficacious as a digester, so to speak, of the diseased membrane. I have all the stronger conviction that lactic acid is destined to become a valuable local remedy in diphtheria, from its great efficacy in faucial and laryngeal tuberculosis, and in lupus. Its action appears to be limited almost solely to unhealthy tissue ; there is, it is true, some circumferential inflammation, but as this leads to the outpouring of scavenging leucocytes, it can only be regarded as a desirable result.

Coming to the best method of removing the membrane, or at least of applying the solution, it has been generally taught that tearing away, or scraping off, the exudation is as useless and injurious a proceeding as would be similar treatment of the pustules of small-pox, and is even dangerous, for the reason that it leads to more thorough systemic infection ; but a diphtheritic patch is probably more comparable to a chancre of syphilis than to an exanthematous rash. I have always myself practised some degree of friction of the diseased surface with a soft but firm applicator well charged with the lactic acid solution, and I have been better satisfied with the results when I have more or less detached the membrane. For this purpose, in the case of children I employ and instruct the nurse to use the index-finger well swathed with lint and soaked in the solution ; and for adults an aluminium, whalebone or vulcanite rod with a firm head of absorbent wool.

[36]Nix of Rude, Denmark, who was reported at the Congress in 1881 to have had great success with free use of lunar caustic after removal of the false membranes, has recently again urged the radical treatment of scraping them away daily with a sharp spoon. In the belief that the disease is purely local, this physician thus aims at extirpating the soil in which the diphtheria is growing.

[37]Watson Cheyne, who also considers diphtheria as 'from first to last a local disease, the general symptoms being merely due to chemical poisoning,' advises 'stripping off the false membrane with forceps, etc., as far as possible, and then applying a watery solution of bichloride of mercury, [so strong as] 1 in 500.' He also urges frequent gargling with a weaker solution, 1 in 2,000—all this being combined with carbolic acid sprays. Early tracheotomy is advocated, and similar treatment of the lower air-passages through the tracheal opening.

Whilst I cannot advocate the application of caustics for the slow removal of false membrane as advised previously by Nix, and again quite recently by [38]May, I believe the time will soon come when Watson Cheyne's surgical procedure will be acknowledged generally to be as efficient as it is scientific. The means of removal, whether sponge, probang, forceps, or vulsellum, is unimportant so long as removal is thoroughly performed. If after detachment of membrane a mercurial application be preferred to that of lactic acid, the **biniodide**, as a non-precipitator of serum-albumen, would appear to possess advantages over the bichloride. It can be used in the form of either spray, pigment or mouth-wash, and in a strength of 1 in 2,000 to 1,000.

I regret to say that I cannot speak except in terms of disagreement with [39]Morell-Mackenzie's recommendation to apply *varnishes* to the throat of a patient, whether of tender or mature years, who may be suffering from diphtheria; for however persistently blotting-paper be previously applied, as advised by him, it is impossible to have a sufficiently dry surface for cohesion of a varnish, more especially since this author is also a strong advocate of hyper-saturation with steam of the atmosphere immediately surrounding the patient. But the treatment is open to still more serious objection, whether considered from the point of view of the nature of the diphtheritic contagium, or of the danger of the exudation in the throat as a mechanical obstruction to respiration. Even if cohesion of the varnish took place, it is doubtful if it would prevent development of the germs, and it certainly would not kill them; while in relation to ptomaines, and other chemical poisons, exclusion of air is highly undesirable. Lastly, the balsamic application is only so much more local hindrance to free respiration.

As to *steam*, I have to repeat what I have said in speaking of croup, that I am not an advocate for its use to the amount recommended by many, because I have often witnessed great vital depression induced by its persistent or extravagant employ-

ment. The indications for this measure will be modified not only by the amount of catarrhal inflammation present, but also by the time of the year, and other surrounding atmospheric conditions. Of course, steam is always employed after tracheotomy.

Oertel recommends six or eight direct inhalations of hot steam a day intercurrently with the carbolic spray previously mentioned; he advocates employment of moist heat in this form, because it 'promotes suppuration, and thereby demarcation and separation of the membranes.' If steam is employed in this way, I would greatly prefer to evaporate with it menthol, Sanitas or Eucalyptus solutions.

In the so-called mild cases, especially those of suspected diphtheritic sore throat, and especially in patients above the age of infancy, benefit would be derived from the wearing of an oro-nasal inhaler, containing oxidizing and anodyne properties (Form. 41), a small portion to be sprinkled on the wool or sponge of the inhaler. After tracheotomy, covering of the tube with corrosive sublimate gauze would be useful, and the inhalant just named could be administered by placing a few drops from time to time on the gauze.

I cannot but think that gargles, and the like, do often but weary the patient; but wherever the nostrils are obstructed, or are the seat of membrane—and in the comparatively few autopsies of patients with faucial diphtheria that I have made, such has always been the case—syringing or spraying of the nares with the biniodide solution, followed by application of lactic acid, is of the highest value. In cases of diphtheria in which, without extension of disease to the nares, there is impeded nasal respiration—and in children this is very frequently the case—I am in the habit of spraying the nostrils with a 10 per cent. solution of menthol in oil, or of applying an ointment of menthol in vaseline, and of similar strength, by means of a small brush. No trouble must be spared to keep the nasal choanæ patent.

Externally, *hot applications* to the throat in the way of poultices are cumbersome, wearisome, and, in my experience, unproductive of sufficient relief to compensate for their inconvenience. In my paper at the Congress in 1881, I made tentative recommendations of *Leiter's coils* for application of **continuous cold** in place of ice-bags; and since that time I have had oft-repeated testimony, in my own practice and that of friends and colleagues, of their great value in diphtheria as a means of applying constant cold without moisture. The effect is to reduce inflammation, and to favour rapid necrosis and separation of the exudation. In my experience

these results are thus obtained more successfully without the depression of the steam inhalations of Oertel. There is, however, nothing to prevent the concurrent adoption of both these measures.

3. **Dietetic** treatment is placed next in order for consideration, because by means of food, medication, both internal and topical, can be largely supplemented. A diabetic diet is theoretically indicated in all microbic diseases. There cannot be a doubt, I suppose, in the minds of anyone as to the value of *ice* taken by the mouth as a grateful, refreshing, and efficient means of reducing hyperæmia, and of aiding to dissolution of the exudation. Seeing the difficulty of making children take ice, I am in the habit of giving them it in the form of frozen milk sweetened with saccharin, or sugar of milk, or of frozen beef-tea. I recommend the same in the case of adult patients, and advise them to take but little other nourishment by the mouth except the raw egg swallowed whole, such as I have recommended for other diseases in which the function of deglutition, being painful and difficult, requires to be rested, or performed with the least possible effort. Regarding this question of functional rest, wherever there is a likelihood of the case becoming a severe one, and especially if food by the mouth becomes distasteful, regular administration of nutrient enemata, at an early period of the disease, should be adopted.

One more measure, which has a topical as well as a general effect, is the free administration of barley-water flavoured with lemon, or even better still is fresh lemonade, either of them being largely impregnated with chlorate of sodium. Frequently, excepting a calomel purge or the administration of a small amount of compound antimonial powder at the commencement, I give no other medicine in the early stages. Fontaine, acting on the principle that germs cannot exist in acid secretions, makes a strong point of ordering gargles and drinks of citric acid. Milk may be given almost *ad libitum*, to be diluted, if necessary, with lime or soda water, or with hyper-oxygenated effervescing water. I have not found milk to disagree with diphtheritic patients, as is by some believed to be the case. Alcohol is to be administered systematically so soon as the strength shows the least sign of flagging, and subcutaneous injection of ether may avert or counteract cardiac inadequacy.

The following recent cases are worthy of record, as illustrating many of the points which I have insisted on in this chapter:

C. B., aged three years, a son of a well-to-do tradesman, had his tonsils removed with the guillotine on September 11th, 1889, in a special hospital; the child, after operation, was taken home by his mother to her residence in the Edgware Road. A week after

operation he was brought back to the hospital in a condition of *malaise*, with deposit of what was thought to be the usual whitish slough on the site of the operation wounds; as this was already partly detached it was removed by the surgeon; but no fear appears to have been entertained of any gravity in the case. Within a week (thirteen days after operation) this child died at home, and the family doctor, under whose charge he was, certified that the cause of death was croup.

Two days later, September 27th, L. B., aged eight years, an elder brother of the deceased, complained of sore throat and was brought to me by the mother. I found a well-marked diphtheritic patch on the left tonsil. On inquiry, it appeared that the shop occupied by this family was in a most insanitary condition. Two other children were suffering from enlarged tonsils and adenoid growths, and a number of workpeople and servants in the house had complained of sore throats for some considerable period. It became evident that the first child, after tonsillotomy, had returned to an insanitary environment, and in those circumstances had readily contracted diphtheria, which had proved fatal in his case and had subsequently infected his brother, the present patient. I have elsewhere insisted that a child with an open wound in the throat is (*cæteris paribus*) more likely to catch diphtheria and scarlet fever, and I have always taught and as far as possible insisted that a child requiring tonsillotomy should, after operation, be kept for a week in a hospital or nursing home.

The treatment successfully adopted in the case of L. B. was on the lines laid down in the preceding pages. On diagnosing a diphtheritic patch on the left tonsil, I at once removed every portion of it and rubbed a 60 % solution of lactic acid into the exposed raw surface, having previously satisfied myself that there was none present elsewhere. As both tonsils were very much enlarged, and together with the soft palate and glands at the angle of the jaw much inflamed, I ordered a Leiter's continuous cold coil to be applied outside the neck to the neighbourhood of the tonsils and larynx. The nasal choanæ, which were markedly obstructed, were well washed out with a detergent collunarium, and the erectile swelling of the turbinals reduced by a menthol paint every three hours. The proper air-way, although very stenotic before the illness, was by these means kept fairly patent during the attack. I placed the patient under the care of Mr. W. Hill, who carefully watched the case, I meeting him occasionally in consultation. This gentleman was energetic in at once removing any sign of pellicular re-formation by means of a sponge probang soaked in lactic acid. No re-deposit took place after the third day, but the lactic acid swabbing, and the menthol applications to the nostrils were continued for a week. During this period biniodide of mercury with bark was administered internally.

The temperature, which stood at 101° at the first, was never above 99° during the application of Leiter's cold coil. The urine contained a little albumen for seven days, but this disappeared on the eighth day, *i.e.*, one day after the administration of iodide of iron. The cardiac symptoms, apart from a rapid pulse of 120, were not serious when the patient was awake, but Cheyne-Stokes respiration was observed on the third, fourth, and fifth nights when the child was asleep. This symptom only occurred apparently when the nasal cavities became much blocked, and did not recur when the choanæ were assiduously kept clear by the nurse with menthol paint, applied every two or three hours during the night. As regards diet, the only point that calls for mention was the fact that Mr. Hill ordered no sugar to be added to milk puddings, lemonade, and other food, on the ground that sugar favours the growth and multiplication of micro-organisms. Saccharin was substituted. This child made a most favourable recovery, and up to the time of going to press has developed no symptoms of paralysis. I saw him as recently as January in the present year.

4. **Operative** measures are generally supposed to be comprised in the one procedure of *tracheotomy*; but it is now fully ten years since I first proposed and adopted the *removal of enlarged tonsils* and *œdematous uvulæ* during the *acute stage* of diphtheria.

All who have any experience of the disease must be aware not only how prone are the subjects of enlarged tonsils to succumb to diphtheritic influences, but also to what a serious extent the existence of such a condition complicates matters, and imperils the chances of recovery. One must have seen over and over again oral and nasal respiration each hour more impeded from this cause, and for the same reason inspection of the larynx made impossible. I therefore in 1878 removed the tonsils of a child suffering from diphtheria on the first occasion of my seeing her. The result was an immediate improvement in her breathing: there was no extension of the disease to the larynx; the membrane was of course re-deposited on the cut surfaces, but it ultimately cleared; the child had several sequelæ of diphtheria, but finally made a very good recovery. I reported the case in detail, and exhibited the patient at the [40]Medical Society of London. Since that time I have had similar cases with an equally good result, and also others in which I have removed from adults swollen and œdematous uvulæ during the acute diphtheric state. I was quite prepared to hear the wisdom of this practice questioned; but however startling the procedure may at first sight appear, any objections which could be raised against it are theoretical rather than practical, and of no account in the balance, when weighed against its advantages—first, as removing an impediment to the respiration; secondly, as tending to prevent the downward progress of the exudation; and thirdly, as an early substitute, or means of averting the necessity for, the more dangerous measure of opening the windpipe. The treatment has since been adopted by [41] Lefferts, who prefers in such instances to substitute the lesser danger of re-deposit for the greater one of the dyspnœa. The same remarks hold good in respect to the removal of *adenoids* causing great naso-pharyngeal obstruction.

Tracheotomy is a procedure that is each year viewed more favourably, mainly because the indications for its performance are becoming better appreciated, and practitioners are now able to assure the relatives of a patient that, when adopted sufficiently early, the chances of success are much greater than formerly. Most of the indications are functional, of which suppression of voice, increasing dyspnœa, stridor, and other symptoms of asphyxia, and especially retrocession of the chest walls, are the principal signs warning us that the air-passages are becoming alarmingly obstructed. If before occurrences of these signals of distress membrane can actually be seen in the larynx by means of the mirror, no delay should be allowed to occur, and the advis-

ability of opening the windpipe should be promptly urged. I am not an advocate for its performance where the chances are hopelessly unfavourable, because knowledge of fatal results tends to influence parents in their consent under circumstances which are favourable. Nevertheless, it is to be noted that in many cases in which death occurs after tracheotomy, the end is much more tranquil than would otherwise have been the case. I speak of this operation principally with regard to children, in whom death by mechanical obstruction is much more frequent than in adults. In the latter, tracheotomy it less successful than in children. But looking to the great value of fresh air in destroying germs, and in modifying the noxiousness of septic alkaloids, tracheotomy possesses an importance beyond that of relieving a mechanical asphyxia, and it is with this especial view that I advocate its early adoption—namely, so soon as membrane is formed in the larynx or trachea.

This is not the place to go into details as to the operation. Doubtless the tracheal opening is to be regarded merely as a preliminary to adoption of measures for clearing the air-passages of membranous obstruction, and the practitioner must not neglect continuance of persevering efforts in that direction, and in such local medication as may prevent exudative re-formations; but I cannot resist commenting in terms of remonstrance against the view of one author on this subject, who, with all the prominence of large capitals, has formulated the following dictum:

'The presence of membrane in the trachea in a fatal case of membranous laryngitis, after tracheotomy, must be regarded as evidence of the want of due care on the part of the surgeon in charge, as much as would the presence of a piece of gut in the inguinal canal after herniotomy, or a calculus in the bladder after the operation of lithotomy.'

Not only is such a dictum on its simple assertion capable of involving many an excellent practitioner in serious trouble with litigious relatives, but by 'a nice derangement of epitaphs' the analogies are entirely inapplicable and illogical.

With regard to removal of the membrane through the tracheal opening, attempts to this end by oral suction, either of doctor or parent, ought not to be necessary in these advanced days of mechanical aids. One very simple instrument for the purpose is that of a Siegel's exhausting syringe, such as is employed in aural practice, with a strong exhausting soft rubber bag to effect suction and the aural end adapted to the mouth of the tube by means of a piece of soft rubber tubing. Another is a modification made

for me by Messrs. Krohne and Sesemann of the aspirator, known as Coudereau's. By this instrument not only can exudation be extracted, but by a very simple contrivance, familiar to all who use aspirators, fresh air, or hyper-oxygenated air, can be introduced into the lungs almost instantaneously after the extraction. An atmosphere of steam is more necessary after tracheotomy than before, since it is most important to guard against the occurrence of fresh inflammation due to inspiration of insufficiently tempered air by the tube.

One other hint, hardly necessary to experts. In removing membrane through a tracheal canula, it is better to clear it by the inner tube; so that in case that passage is blocked, freedom can be given to respiration through the outer canula. A double canula, always of value in tracheotomy, is of indispensable importance in cases of diphtheria.

Intubation of the larynx is a method of procedure for relieving laryngeal dyspnœa by introducing a tube through the mouth, and placing it in the larynx, with its upper end below the epiglottis. Although this procedure was first adopted by Bouchut in 1858, the credit of re-introducing and gradually perfecting the method now in use must be assigned to Dr. Joseph O'Dwyer, of New York, who commenced his experiments in intubation in 1880.

In the last edition of this work I stated that intubation was still on its trial, and I mentioned some objections which, to my mind, rendered it doubtful whether intubation could ever largely supersede tracheotomy. Since then the operation has been performed extensively in America, and to some extent in this country. I had the opportunity of seeing some cases at Chicago, under the care of Dr. Waxham, and I have since had some encouraging experiences of the operation in my own practice. I am bound to confess that my former objections have been almost entirely dissipated, and in a [42]Paper which I read at the meeting of the British Medical Association at Glasgow, in 1888, I stated somewhat fully my present views on the subject, which further experience has confirmed.

The vast difference in the frequency with which the operation has hitherto been performed in America and in this country, is no doubt partly due to the greater prevalence of diphtheria in America, owing to less perfect sanitary arrangements. I think, however, that it is probable that the laryngeal mirror, not having been used in the majority of cases, for the purpose of forming an exact diagnosis of the condition of things, the operation may have sometimes been performed for mere spasm, and before membrane

had extended to the glottis. In any case, it is unquestionable that some of those who have had the largest number of cases of intubation in America, are not laryngologists, nor expert with the laryngoscope. On the other hand, a large number of cases have been recorded by Roe, Ingalls, Casselbury, Stern, and Bleyer, tc the nature of whose cases such an objection could not possibly be advanced.

A set of intubation intruments, as now generally sold, consists

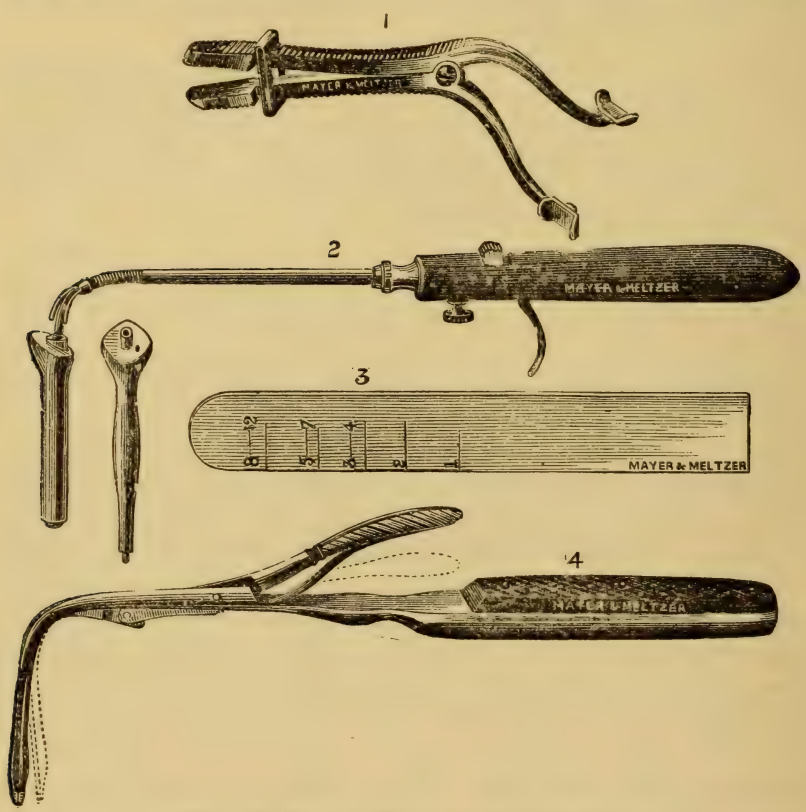

FIG. CXXV. *a.*—INTUBATION INSTRUMENTS.

of five *laryngeal tubes*, together with a *gag*, an *introducer* and an *extractor* (Fig. CXXV. *a*). A scale is also supplied indicating the length of the tube suitable for a particular age. The tubes are made of brass plated with gold, and vary in length from $1\frac{3}{8}$ to $2\frac{1}{2}$ inches. The calibre of the largest tube is about $\frac{1}{4}$ by $\frac{1}{8}$ inch, and that of the smallest about half that size. The upper end of the tube is expanded into a head, which rests on the ventricular bands, and prevents the tube slipping down into the trachea. The anterior parts of the head is bevelled off so as not to press on

the base of the epiglottis. There is a small hole near the anterior part through which a thread can be passed. In the middle of its length is a fusiform enlargement, by which the tube is retained in the larynx. Each tube is supplied with a so-called obturator, which is inserted into the tube, and fits the openings accurately at each end. In the upper end of the obturator is a small hole by which it can be screwed on to the introducer when the tube is about to be used. At the distal end the obturator projects slightly, so as to form a probe-pointed extremity, which diminishes the risk of injuring the parts during introduction. The introducer consists of a handle and a shank, bent at its distal end at a right angle. To this end the obturator is screwed on, and by pressing a button in the upper surface of the handle two claws can be made to project downwards on the head of the tube, so as to push it clear of the obturator, and to allow the introducer with the attached obturator to be withdrawn when the tube is in position. The extractor is a curved instrument, at the distal extremity of which two small blades can be made to dilate by pressure on a spring in the handle. The extremity is inserted into the tube with the blades closed, when pressure on the spring causes the blades to open, and the tube to be firmly held.

In *performing intubation* the first step is to select a tube suitable to the age of the child, which may be done approximately by reference to the scale. The tube is threaded with a piece of braided silk, some sixteen inches long, the ends of which are tied together. The obturator is then screwed on to the introducer, and the tube is fitted on to the obturator. The nurse, seated upright in a straight-backed chair, takes the child in her lap, with its back pressed against her left chest, and its head thrown slightly backwards, resting against her left shoulder. She passes her arms round the child, and crosses its forearms in front, and holds the wrists tightly, and if necessary she secures the child's legs between her knees. The gag is next placed well back at the left corner of the mouth, and an assistant, standing behind the nurse's shoulder, holds the gag and steadies the head between his hands. The operator, standing or sitting in front of the child, takes the introducer in his right hand and hooks the loop of thread round the little finger of the left hand. He then rapidly passes the index-finger of the left hand over the tongue, and behind the epiglottis, till the upper orifice of the larynx is felt. With the handle of the introducer held close to the patient's chest, the tube is introduced into the mouth, and passed back over the base of the tongue, guided by the index finger, and kept as

nearly in the middle line as possible. When the point of the tube reaches the epiglottis an abrupt turn is given to its course by raising the handle of the introducer, and thus bringing the tube into a vertical position. The tip is then passed down into the larynx along the palmar surface of the guiding finger. As soon as the tube is in the larynx it is detached from the introducer by pressing forwards the button on the handle, and as the introducer with the attached obturator are withdrawn, the tube is pressed down with the tip of the left index finger until the head is felt to rest on the ventricular bands, when the finger is at once withdrawn.

Fig. CXXV. *b*, which is taken from [43]Dr. Waxham's book, represents the curve that should be made by the end of the tube while it is being introduced, the dark line indicating the path it should follow. If the point of the tube be continued in the curve,

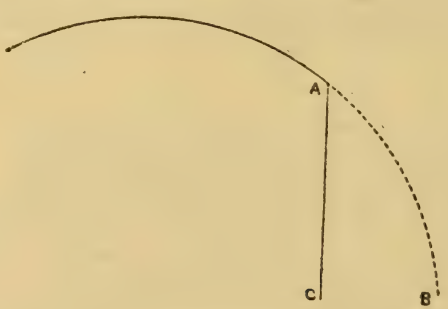

FIG. CXXV. *b*.

as indicated by the dotted line, it will invariably enter the œsophagus.

The entry of the tube into the larynx is indicated by violent coughing, quickly followed by easy breathing. I have been astonished by the rapidity with which the bases of the lungs are aerated, and if there is any doubt as to the position of the tube, the surgeon's ear applied to the back of the little patient will often settle it. If it has passed into the œsophagus there is no violent coughing, and no relief is given to the breathing, and the loop of thread will be found gradually shortening as the tube sinks into the œsophagus. In that case the loop should he pulled upon and the tube withdrawn. When quite satisfied that the tube is in the larynx, the operator removes the gag and waits a few minutes to allow the cough to remove the mucus and fragments of softened membrane. It is recommended that the gag should be then replaced, and the loop cut close to the mouth, and while the left

index-finger is passed down on the head of the tube to steady it, the thread should be drawn out, but in many cases it is better to leave the thread in for a short time, fastening it to one or other cheek of the patient's face by a small strip of plaster.

When the tube has to be extracted, the patient is placed in the same position as for introduction. The gag is inserted, and the left index-finger is passed behind the epiglottis till it feels the opening in the head of the tube. The extractor, in the right hand, is introduced, and its point guided into the opening by the finger. By pressing on the lever in the handle, the blades are dilated, thus holding the tube firmly while it is withdrawn.

Intubation of the larynx is an easy and safe operation in the hands of an operator possessed of moderate dexterity and a thoroughly practical acquaintance with the parts dealt with, but to one not accustomed to put his finger in this part of the throat the first attempt will often be attended with difficulty or failure. As I have remarked in the paper already referred to, it is in a sense a tribute to the merit of intubation that the most successful results have hitherto been obtained by practitioners, not laryngeal specialists. With the gag in the mouth it is perfectly possible to see the glottis with the laryngoscope, especially with the aid of Dr. Bleyer's traction hook, which exposes the epiglottis; and it is certainly more easy and rational to introduce the tube by means of the eye than by the sense of touch, especially as by the introduction of the hand there is great risk of increased suffocation, as well as of injury to the soft parts in a condition of inflammation or ulceration. Moreover, to learn the knack of introducing an instrument by sight requires no more practice than the guiding of it by the sole aid of the finger.

After the tube has been placed in the larynx, and after the first effects of irritation have passed off, respiration will usually be carried on easily. It has occasionally happened that during the introduction false membranes have been detached and pushed down before the tube, thus causing suffocation. The accident is rare, and when it has happened, immediate removal of the tube has almost invariably been followed by coughing up of the membrane. Should this not occur, tracheotomy should be done, and it is therefore well to have tracheotomy instruments ready at hand.

During the course of the treatment, the tube is cleared of mucus by the ordinary efforts of respiration and cough. If it become clogged, it is usually coughed up. There is, as a rule, no danger of suffocation in such cases for some hours, so that ample

time is usually allowed to summon the physician or surgeon in charge. Sometimes the tube is coughed up independently of getting blocked. When the tube is very easily coughed up, it is an indication that the size used is too small. It is usually ejected from the mouth, but it has occasionally been swallowed, and in all the recorded cases where this has happened (with one exception, when it was found post mortem no further down than the stomach), it has been passed without difficulty *per rectum*. The tube must be extracted at any period of the treatment if there are symptoms of its being obstructed. Otherwise most operators do not interfere with it. In the course of from four to six days the swelling and spasm will have so far diminished that the tube will be coughed up, and it will then probably be found that it is no longer required. If, about the sixth day, it be not coughed up, it should be removed with the extractor, and need not again be introduced if the breathing is easy.

Some children, after intubation, swallow without difficulty both liquids and solids. In others, each attempt to swallow, more especially liquids, excites cough, owing to the entry of some portion into the air-passages. Semi-solid food is therefore preferable. It is, however, usually possible to overcome the difficulty of swallowing, even of liquids, by placing the child on its back in a horizontal position with its head hanging backwards, as described by [44]Casselbury. In this position the child may suck from a bottle or be fed with a spoon. In some cases the child swallows as well, or better, lying on the abdomen with the head hanging forwards—that is, in the same position as that found to be convenient in cases of dysphagia, due to tuberculous ulceration of the epiglottis. In a series of intubations recently performed at the Victoria Hospital for Children there was little difficulty of swallowing noted. I have had two cases, however, in which it was a source of some trouble at first.

In young children intubation has given better results than tracheotomy. [45]Stern's statistics show that under three and a half years, intubation gives a decidedly larger number of recoveries. Being a bloodless operation, and not requiring an anæsthetic, the consent of parents is more easily obtained, and thus children are saved who would otherwise die, owing to inability to obtain the parents' consent for tracheotomy. For a similar reason, the operation can be performed earlier, before the patient is moribund—as too often happens with tracheotomy. Finally, for the poor in their own homes, I think it is decidedly superior to tracheotomy. The tracheotomy tube requires constant, and even skilled atten-

tion, whereas the intubation tube, once in place, as a rule takes care of itself.

5. **Hygienic and prophylactic** measures to be observed with regard to diphtheria differ in no respect from what would be required in the case of any other infectious or contagious disease. They consist essentially in the embracing of every opportunity of purifying the air of the sick-room, and purging it of exhaled and volatile toxic ingredients that may be generated. This purpose is best effected by securing to the patient an atmosphere well charged with oxygen, and by taking every other precaution against a further development of the poison as conveyed in the defecations and eliminations of the tainted individual.

The patient must therefore be isolated as far as possible from other inmates of the house, and be placed in a large airy room, the temperature of which should be regulated according to the season of the year and the barometric condition of the atmosphere. If the case occur in the winter months, the wind being in the north or north-east, the air of the room is not only to be well warmed, but also softened by steam ; if in foggy weather, with wind in the south-east, a drier warmth is indicated. If, on the other hand, the case occur during the summer, fresh air, with precautions against draught, may be admitted to a much freer extent, and steam may be almost dispensed with. All excretions should be treated with strong liquid disinfectants, and the w.c. employed for their bestowal should not be used even by the immediate attendants.

Since disinfection of the atmosphere by chlorine, euchlorine, iodine, bromine, sulphurous acid, or any of the other more active, but somewhat suffocative disinfectants is not always possible in the patient's room or immediate neighbourhood, the atmosphere passing to and fro the doors and passages of the sick-room may be asepticized by sheets soaked in Burnett's fluid, Sanitas, Eucalyptus, and similar solutions. A 'Sanitas' kettle may be conveniently placed outside the room, so that when the door is opened, the air comes in not only warm and moist, but impregnated with oxidizing constituents. Sprays of Condy, Sanitas, etc., by means of hand-ball or steam atomizers, may also be employed.

After tracheotomy loca precautions against admitting untempered air through the tracheal tube must be rigidly pursued.

In view of the possible occurrence of syncope, the patient should be kept perfectly quiet as regards bodily movement, and should be nourished by means of 'feeders,' so as not to allow even the raising of the head from the pillow.

I have for many years insisted that all persons in immediate

attendance on diphtheritic patients should gargle freely with some antiseptic or detergent solution (Form. 8, 9, 10, 11) after each ministration that may have involved standing over the patient in such a way as to have inhaled the breath. I would also suggest a more general adoption by them than now obtains of the nasal douche, containing antiseptic or detergent remedies (Form. 72, 73, 74, 76, 77, or 78). Lozenges of chlorate of potash, carbolic acid, etc., are also useful for this purpose. Lastly, I always personally give effect to a hint derived from a sanitary architect, who, whenever he is obliged to inhale any unpleasant effluvium, blows his nose freely, gathers his saliva, and expectorates.

ADDENDUM REGARDING 'ETIOLOGY,' TO PRECEDE 'INCUBATION,' P. 338.

During a recent visit to South Africa, Dr. Herman, of Cape Town, kindly gave me some interesting notes of his experience and observation in that country. The disease, as here, is most prevalent in the damp weather of autumn and winter, and in Cape Town has presented itself as isolated cases in the suburbs and better parts of the city, rather than in the insanitary slums where typhoid is of course common. Dr. Herman has always found the disease in proximity to 'manurial and vegetable deposits,' or to 'cow-stables.' He points out that diphtheria, which is rather frequent 'up country,' appears in isolated farms in the sheep and cattle districts, where the animals are often herded in kraals, and where decaying refuse is not only in proximity to the dwelling-houses, but also close enough to contaminate the water supply. My own experience has long tended to confirm this view, first put forth in print by Renshaw, that diphtheria is especially apt to be associated with the proximity to heaps made up of *both* animal and vegetable refuse. I have known three cases in which an attack in a household had been preceded by a manifestation in the families of coachmen in adjoining stables. In one other instance there was connection of the drainage from the stables with that of the house; and, lastly, I have recently had knowledge of one in which the probable source of origin was a very insanitary pigsty.

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CHAPTER XVIII.

SYPHILITIC LARYNGITIS.

(Figs. 56 to 67, PLATE VII.)

THE mucous membrane of the larynx may exhibit the specific manifestations of this disease in either the secondary or tertiary stages. The great frequency of syphilitic laryngitis is described by [1]Gerhardt as largely influenced by fortuitous catarrhal inflammation, and the experience of all laryngoscopists in hospital practice will confirm this view. Another predisposing cause to the greater amount of advanced syphilitic disease of the larynx in the poor, doubtless exists in the apathy and neglect with which, after long existence, such affections are treated, and also often to a badly nourished state of the body.

SECONDARY SYPHILIS (Figs. 56 and 57, PLATE VII.):

The larynx is affected at this period of the disease at any time from six months to two years after exposure to the primary infection. Syphilitic laryngitis is present only in a comparatively small proportion of cases of all varieties of throat disease, but syphilographers differ so widely as to the ratio in which the larynx is implicated, that no useful conclusions can be drawn from their statistics. According to [2]Lewin, the larynx is affected in 4·8 per cent. of all cases observed, whilst [3]Willigk gives 15·1, [4]Roth 32, and [5]Sommerbrodt 34 per cent. as the proportion. All agree that it may occur either as an extension from the pharynx, or, as is more commonly the case, at a somewhat later period, and independently of the pharyngeal manifestation. The truth of this last suggestion is evidenced by the fact that the larynx is often first affected after the disease in the pharynx has been cured, or without the latter ever having suffered to such an extent as to call for medical aid; the characteristics also of secondary inflammation in the larynx are by no means so differentially distinctive as are those in the fauces. It may be

broadly stated that the probability of the larynx becoming implicated stands in direct ratio to the duration and virulence of the infection, and in a large degree to prompt and persistent adoption of appropriate therapeutic measures from its first manifestation.

Secondary syphilis in the pharynx is almost invariably accompanied by cutaneous manifestations, whereas if the latter have ever been noticed, they will often have disappeared months before the larynx is affected.

Mucous deposit also is rare, and by no means a constant product of syphilitic inflammation occurring in the larynx; nor is such inflammation or such deposit invariably, or indeed usually, symmetrical. Loss of tissue is infrequent, and ulceration, which seldom extends beyond erosion of the epithelial layers, occurs at points likely to be subjected to irritation from the passage of food or from mutual contact in vocal exercise.

Condylomata not infrequently occur in various situations in the larynx—notably in the epiglottis. Their presence is denied by some observers, while others estimate their manifestation in proportions varying from 1 to 36 per cent.; Morell-Mackenzie in [6]1876 reported that he had found them only twice in fifty-six cases, but in [7]1880 had 'met with forty-four cases of condyloma among 118 patients suffering from the early symptoms of laryngeal syphilis.' These two statements constitute a great discrepancy—the first represents a proportion of about 4 per cent., while the second of 38 per cent. agrees closely with that of Gerhardt and Roth who, as previously stated, found condylomata in 32 per cent.—that is, in eighteen instances out of fifty-six patients suffering from constitutional syphilis—to which statement Mackenzie had pointedly objected in his earlier views. These differences depend partly, as the last author has said, on the time of year that examinations are made, and partly, it may be added, to the limit ascribed to the secondary stage.

Contrary also to the experience of Mackenzie, I have seen not a few cases in which condylomata have developed into formations which were, to all intents and purposes, warty growths; nor can I agree that such formations have in the larynx, any more than on the skin, *at points where irritation is constant*, a tendency to spontaneous subsidence. All secondary syphilitic affections of the larynx are characterized, as are those associated with the same dyscrasia in other organs, by rapid amelioration under appropriate treatment, but by an equally strong tendency to relapse. This fact is often of great diagnostic value in doubtful cases of chronic laryngitis.

With regard to this disposition to relapse [8]Whistler has called deserved attention to the '*relapsing ulcerative laryngitis*' which marks what he has called the intermediary stage of syphilis. In this condition the ulcerations, though more superficial than in the true tertiary stage, imply a deeper loss of tissue than in the more commonly seen erosions of the true secondary. They probably indicate not only a more pronounced specific taint, but are also caused by a greater degree of adventitious inflammation of the larynx in the first instance.

Symptoms: A. Functional.—Under the influence of severe atmospheric or other exciting cause of laryngitis the **voice** of a syphilitic person is much more liable to be completely lost, and is restored less quickly and completely than in a non-specific case. It may be stated generally that alteration of this function is characterized by early and very persistent husky hoarseness. When once appreciated, the raucous syphilitic voice is so distinctive that the practised ear will recognise the disease as soon as the patient speaks.

Vocal exertion always increases the dysphonia, and the singing voice is entirely destroyed for the time: it is, indeed, doubtful whether a vocalist who has once suffered from syphilitic congestion of the vocal cords ever regains complete purity of tone, submucous changes, slight though they may be, preventing perfect co-aptation and co-ordination of those structures.

Respiration is but seldom embarrassed, but the breathing is frequently described by the patient as wheezy. Extension of the inflammation into the trachea and larger bronchi is common, and on auscultation râles may be often heard.

Cough is only occasioned by the desire to clear away expectoration, or after the irritation caused by talking or eating.

Pain, except a sense of effort in the use of the voice, is rarely experienced in the earlier forms of laryngeal syphilis.

B. Physical.—**Colour.**—On looking into the larynx of a patient suffering from secondary syphilis, one is struck first by the somewhat—not always, however, well-defined—mottled discoloration, and secondly by the fact that the hyperæmia does not appear to be so superficial, nor so vivid in colour, as in simple chronic inflammation. This distinctive appearance is more particularly seen on the vocal cords, which are observed to be more or less congested, in patches of varying intensity, the non-hyperæmic portions being of a greyish tone. Mucous deposits when present are visible most frequently on one or other ventricular bands, on the free edge of the epiglottis, the arytenoid

cartilages, and at the posterior commissure. Gottstein well describes the appearance of mucous patches as that of 'round or elongated greyish-white spots of thickened epithelium slightly raised above the congested tissue which surrounds them, and are either sharply circumscribed or shade gradually off into it.'

Form and Texture.—Beyond occasional slight want of equality in muscular action, there is seldom alteration of form. Condylomata are occasionally seen on the inter-arytenoid fold, and on the free edge or lingual surface of the epiglottis. In long-standing cases, and when the voice is unduly exercised, there may be loss of surface-tissue on the arytenoid cartilages and on the vocal processes. It is comparatively rare to find erosion of any other portion of the vocal cords.

Secretion, in secondary syphilis, is scanty and viscid, the patient frequently making a point of complaint that the cough is very dry.

C. MISCELLANEOUS.—External signs of syphilis on the skin are often wanting, for the reasons already given, and, when the pharynx has not been attacked, they may have been so slight as to have entirely escaped the notice of the patient. The most uniform corroborative symptom is that of post-cervical glandular enlargement, but that cannot be said to be by any means universal. In fact, the surgeon will often be at a loss to arrive at a distinct conclusion as to the nature of the disease from the usual commemorative signs, especially in the case of those patients (married women, for example) of whom it is unadvisable, for ethical and family reasons, to ask questions. In such cases, reliance must be mainly placed on the results of physical investigation of the larynx itself.

The general health is of course tainted by the specific poison, but it does not suffer to the same extent as in the earlier or in the much later epochs of the disease. Thus there is seldom much variation in temperature, though there may be slight fever at night; the surface temperature may be ordinarily rather increased, and the perspiration somewhat scanty. All the symptoms suffer some nocturnal exacerbation.

PROGNOSIS.—The course of the disease under treatment is favourable, though, as intimated above, the chances of a permanent loss of singing voice or of a chronic hoarseness are not to be overlooked, nor the possibility of the development of quasi-new formations.

There is a strong disposition to relapse on the slightest catarrhal provocation, and this tendency is naturally somewhat increased during the time the patient is under active treatment.

TREATMENT: **General.**—A mild mercurial course is naturally indicated, and is most serviceable. The Turkish bath, followed by the calomel vapour-bath or by moderate mercurial inunction, is of great value, both for its general and local effects.

Whenever condylomata appear, or when there is any symptom of ulceration, iodide of potassium or sodium, with or without mercury, is indicated.

Local.—Stimulating inhalations, of precisely the same character as were recommended in simple chronic laryngitis, are of the first importance. External applications of tincture of iodine, or mercurial ointment with iodine and belladonna, have a decidedly beneficial effect.

Topical applications to the larynx are of far greater value than in simple chronic congestion, and must be pursued with proportionately greater regularity and perseverance, even after the inflammation has disappeared from the vocal cords. Allusion has already been made to the absence of warrant for the traditional preference of the profession for nitrate of silver in laryngeal disease. This remedy should only be applied when there is actual ulceration. Solutions of chloride of zinc and of sulphate of copper are found by us the most useful as local applications in secondary inflammations; alternation of the solutions frequently having a great effect in promoting the cure. In very obstinate cases, spa treatment at Aix-la-Chapelle or Bagnères de Luchon may with advantage be prescribed.

Hygienic and Dietetic.—The indications are to give rest to the voice, and to avoid exposure to all catarrhal or irritative influences of atmosphere and nourishment.

TERTIARY SYPHILIS (Figs. 58 to 67, PLATE VII.).

This form of syphilis is characterized by ulceration of the most destructive character, causing permanent loss of tissue, followed by resulting cicatrices, which may either produce great narrowing of the larynx, or may be accompanied by new deposit having the same effect.

It occurs in the throat as one of the latest manifestations of the disease, and is often seen twenty or thirty years, or even at a still later period, after the primary infection. It may commence as an extension of the disease from the fauces, in which case it very seldom advances beyond the epiglottis, and under these circumstances there is neither much thickening nor displacement, nor any great amount of trouble in the performance of function.

From the velum, or posterior wall of the pharynx, the disease very seldom descends into the larynx, and cases may frequently be seen in which the whole posterior wall of the pharynx is the seat of deep ulceration, extending upwards into the naso-pharynx; but in which the larynx is absolutely free from any sign of ulceration, and in which, although articulation is affected, the phonetic quality of the voice is unaltered. Such was the condition in the case, the naso-pharyngeal appearance of which is depicted in Fig. 39, PLATE V.

These remarks hold good also with respect to congenital syphilis in the larynx, which will be presently considered.

I, however, remember a case, seen some fifteen years ago, in which it appeared possible to believe that the patient, a young man of 22 or 23, was the subject both of hereditary syphilis and of the same disease in the acquired form. His father was under treatment for tertiary laryngeal manifestations, while the younger man, having characteristic teeth and physiognomy, and with cloudy corneæ, had been under medical care for palatal ulceration, acknowledged to the primary infection, had the scar of a chancre, and some years after his first appearance as a patient suffered from syphilitic invasion of the larynx.

It is not easy to affirm that the ulcerative process is always the result of degeneration of gummatous deposit, since the patient frequently does not come under observation until loss of tissue has already taken place; but from the appearance of those ulcers which are the undoubted sequel of gummata, it seems probable that such is the usual origin of laryngeal tertiary ulceration.

The epiglottis, subjected as it is to greater irritation than any other part of the larynx, is the portion most frequently attacked; but it cannot be said that any one other part is more prone than the rest to the destructive process. Gottstein, however, places the vocal cords as the tissues first attacked, then the epiglottis, and lastly the posterior commissure.

SYMPTOMS: A. FUNCTIONAL.—**Voice.**—This is frequently not at all, or but very slightly, affected when the epiglottis only is attacked; and is quite restored when the disease, limited to that valve, is healed.

Usually, however, permanent hoarseness, and even aphonia, is a prominent symptom.

Respiration may not be affected even when there is considerable active ulceration; but on cicatrization embarrassment of respiration is a most frequent as it is a most alarming symptom.

Difficulty of breathing may also be due to actual narrowing of the glottic space by œdema of a slowly subsiding and readily relapsing character, and also by the formation of cicatricial adhesions and new growths; it may further depend upon infra-

glottic stenosis of the same character, or upon constriction of the trachea just above the bifurcation, that being the most common seat of tracheal stricture.

Another cause of dyspnœa is a mechanical one, and arises from fixation of one or other arytenoid cartilage, due to fibrous deposit around the articulation. Several instances of this kind have come under my observation. In such a case the vocal cord of the affected side will be seen to be paralyzed, as if from pressure on the recurrent nerve; the respiration, however, will be less impeded, and there will not be the paroxysmal exacerbations so characteristic of nerve-pressure.

Attacks of dyspnœa will, of course, vary in character according to their cause. When due to stenosis, there will be stridor on exertion, and on the occurrence of quite slight catarrh, alarming attacks, which partake of all the characteristics of an asthma. The patient may recover from one of these attacks, and enjoy comparative immunity from recurrence; but the intervals of remission become gradually shorter, until at length they become so frequent and persistent, that life is threatened by exhaustion, by laryngeal or tracheal spasm, or by asphyxia.

Syphilitic laryngeal œdema has been already considered in the chapters on submucous inflammations, and on perichondrial changes. As pointed out in the latter section, extrusion of a cartilage by no means necessarily follows on inflammation or degeneration; for it not infrequently becomes imbedded in connective or fibrous tissue.

Cough.—In the ordinary course of active tertiary inflammation there is nothing to call for special remark in this symptom, except that the expectoration is of a distinctly muco-purulent character, and often contains portions of disorganized tissue; in which case there may be more or less hæmorrhage. Portions of the tracheal rings, or of the laryngeal cartilages, or even a whole arytenoid cartilage, may be expectorated.

When the air-passages are narrowed, the cough partakes of the characteristics of the advanced stage of œdematous laryngitis with stridulous inspiration, intense spasm, and a varying degree of aphonia. When there is constriction of the trachea, the sound of the cough cannot be mistaken; it resembles more than anything that of laryngismus stridulus, or of whooping-cough; but the high note caused by obstruction to the ex-spired air is changed by proceeding from lower down in the windpipe.

The expectoration in these cases is of the scanty, glairy character seen in asthma, and, as in that disease, relief is not

experienced until the secretion imprisoned at the constricted spot is liberated.

Deglutition.—This is naturally impeded when the epiglottis is attacked, though it is surprising how much of that valve may be lost without interfering with the act of swallowing, provided the pharynx be not also involved. **Dysphagia** is much more frequently experienced when the pharyngeal border of the posterior wall of the larynx is actually diseased. After-thickening of the epiglottis, provided its hinge-movement is free, does not appear to affect deglutition, and almost the whole of this valve may be destroyed without any impairment in the function of swallowing. **Odynphagia** is rare, and the same may be said with regard to **pain** generally, unless there be perichondrial inflammation; and, indeed, this absence of pain has come **to** be regarded as a differential symptom of importance.

B. PHYSICAL.—**Colour.**—The natural colour of the general surface of the larynx is markedly increased in intensity. After the ulceration has healed, the laryngeal mucous membrane loses its original delicate semi-transparent hue, and is seen to be of an opaque dullish red. Sometimes this redness is modified by a blue-greyness of tone. It will be noticed, for example, that the normal warm buff-colour of the epiglottis is lost, and that this part will look as if of exactly the same structure as the arytenoid cartilage. The ary-epiglottic folds will appear as solid as the ventricular bands, and the vocal cords will be so changed in appearance as to have lost all their pearly lustre. Sometimes in the stage of acute inflammation they will appear to have quite degenerated from their fibrous firmness, and to have the consistence and colour of an active granulation. When the disease has become very chronic—that is to say, where a long interval has elapsed since the last inflammatory attack—the whole surface of the larynx often acquires a greyish or yellowish appearance from submucous changes.

Gummata in the larynx have been described by [9]Mandl as having a greyish-yellow tint, but by [10]Türck and others as being of the same colour as the normal mucous membrane.

As seen by myself, they have generally exhibited decidedly increased vascularity when occurring on the ventricular bands, inter-arytenoid fold, and arytenoid cartilages; when on the epiglottis, they appear as nodes of a somewhat paler colour than the congested surface from which they spring. Prior to breaking down, gummatous swellings generally assume a yellowish hue at the central and most superficial point.

Form and Texture.—The order of appearances under this head will be thus:—Loss of tissue, thickening, cicatricial narrowing.

When there is loss of tissue, the characteristic of the tertiary syphilitic ulcer in the larynx is nothing less than typical, and cannot be better described than in the words of Türck, as having 'a more or less circular form, a deep floor, covered with a whitish-yellow coating, sharp, sometimes strongly elevated margins, surrounded by an inflammatory areola.' It need only be added that the margin is hardly circular, but appears of a multiple crescentic form; in this respect somewhat resembling the manner in which the mucous patches appear on the pharynx in the secondary stage. A comparison of the PLATES III. and VII. will at once illustrate and elucidate this point.

When the edge of the epiglottis is ulcerated, it is eaten out in distinct notches with clean edges; and the disease will proceed, by the way of the ary-epiglottic folds, to extend to the rest of the larynx.

The secretion of the ulcers is not at first very profuse, and is then pale in colour and of creamy consistence; but when the cartilages become attacked, there is free purulent discharge, having the characteristic odour indicative of caries.

The thickening of tertiary syphilis on healing is as distinctive as the ulceration which precedes it; occurring, as it does, as a sequel of ulceration instead of being a forerunner of that process, as in phthisis, and being of the nature of excessive activity of growth at the periphery of the ulcer, with marked lack of productiveness at the centre. We have, as a result, contracting cicatrizations of dense fibrous unyielding character, very difficult to reduce, and very apt to re-develop on division and dilatation. (See Figs. 65 and 66, PLATE VII.)

Cicatricial narrowing of the larynx is attended, as we have seen to be the case in œdematous swelling of the same region, with the greatest danger to life, and for somewhat similar reasons—viz., not only because there is narrowing of the air-passages, but also because there is very frequently a superadded impediment to the free action of the vocal cords.

A case is delineated as Fig. 67 in Plate VII., in which the left arytenoid cartilage having been expelled as a result of ulceration and caries, the corresponding vocal cord became paralyzed and then atrophied.

Position, or the relative situation of the various parts of the larynx, may be greatly altered by cicatricial deformities. Out-

growths from the pharyngeal wall are often observed. They are occasionally of very eccentric shape, and not uncommonly advance across the laryngeal opening, but they seldom exercise compression. In this respect they differ greatly from a malignant encroachment of the pharynx on the larynx.

C. Miscellaneous.—There is seldom any external local swelling of the larynx, except in occasional cases of perichondritis of a specific character. The constitutional symptoms need not be dwelt upon, except to say that the absence of cachexia, so frequently to be noted, is of marked diagnostic value in differentiating this affection from phthisis and cancer.

Prognosis.—This must always be guarded in a case of tertiary disease of the larynx, if there is the least evidence either of perichondritis or of stenosis, and especially if, in the former case, the cricoid cartilage is attacked. Death may result from acute œdema of the larynx, occurring suddenly during the active ulcerative process. Another possibility of fatal termination, fortunately not a common one, is that of hæmorrhage.

If, however, the disease come sufficiently early under the notice of the surgeon, a very favourable opinion may be given, both with reference to life and to modified restoration of functions. Ulcerations of the epiglottis, of the arytenoid cartilages, and even of the vocal cords, will heal with almost marvellous rapidity, and the worst result to be anticipated is some slight loss of comfort in deglutition, or a permanently hoarse voice.

The following case is an interesting example of the insidious mode in which syphilis may attack the larynx; it also well illustrates the happy results of treatment:

Mrs. O., æt. 39, married eleven years, was first seen on March 8th, 1882, on account of difficulty and pain in swallowing, which had existed for ten months. At first the dysphagia had been greatest with fluids; now solids were swallowed not only with difficulty, but with pain. Her voice had been lost for five months, her breathing was somewhat short on exertion, and she was troubled with distressing cough accompanied by slightly sanguineous expectoration. She had become greatly emaciated, and her weight had been reduced from 154 lb. to 99 lb. One child had been born and was alive, aged 10 years; but no further conception had occurred until about four years previous to her visit. Since then there had been three miscarriages. The patient was sent to me as the subject of either phthisis or carcinoma, but with the laryngoscope the nature of the case was at once revealed (Fig. CXXXIV.). Not only was the whole larynx greatly swollen, but the epiglottis was both thickened and inflamed in an intense degree. Fully a third of this valve had been destroyed, and the ulcerative process was still advancing. The patient was at once ordered 15 grains of iodide of potassium with 10 grains of bromide of potassium three times daily, and frequent steam inhalations of benzoin and chloroform (Form. 30). The solid nitrate of silver was applied daily, for ten days, to the ulcerated

surface with the aid of the laryngeal mirror; when the destructive process being checked, a solution of sulphate of copper (Form. 61) was substituted locally, and biniodide of mercury was given internally. In forty days the larynx had assumed the appearance depicted in Fig. CXXXV. The patient could eat well, and had gained 9 lb.

FIGS. CXXXIV. AND CXXXV.—TERTIARY SYPHILITIC ULCERATION OF THE LARYNX.

[The first drawing represents the condition on commencement of treatment; the second five weeks later.]

in weight. The after-history was one of continued improvement, under modified mercurial treatment, and six months later she had further recovered flesh so that the scale indicated 142 lb. A very interesting feature was the drawing over of the epiglottis towards the right side, an effort of nature to overcome the gap formed by the ulceration.

TREATMENT: **General.**—During the active stage of ulceration, the administration of the iodides of potassium or sodium (Form. 94) is in the highest degree beneficial. Seeing, also, that the majority of the worst cases occur in very poorly-fed persons, cod-liver oil and iodide of iron are of great therapeutic value. In other cases the iodide may be occasionally remitted, and cinchona with ammonia, or acid, substituted. Whenever patients resist the iodides, a systematic course of 20 to 25 mercurial inunctions should be employed. When the ulcerations are healed, preparations of mercury must be given for a lengthened period, as prophylactic against future attacks (Form. 91, 92).

Local.—There is no better topical remedy for syphilitic ulcers than nitrate of silver, which must be applied *daily* with the aid of the laryngoscope. If there is much coating of secretion over the ulcer, it should be first removed by means of a soft moist brush, or a piece of absorbent cotton-wool in a suitable holder.

When the ulceration is of the epiglottis, the galvano-cautery acts more rapidly in arresting the destructive process than even nitrate of silver.

Laryngeal œdema must be met by the prompt performance of tracheotomy, unless it quickly yields to medical treatment. Tracheotomy may also be necessary, at least as preliminary to later measures, if stenosis becomes extreme.

The tube should always be inserted in the lowest point possible in the trachea, and should on no account be removed, however favourable the symptoms may appear, unless laryngoscopic examination give evidence that the physical obstruction is lessened.

At a very early period after tracheotomy it will be well to make an opening in the superior surface of the canula, and to allow the patient to wear a pea-valve, so as to favour a natural process of dilatation by means of the current of air.

It is well to warn the patient on whom tracheotomy has been necessary on account of such a condition, that he may be obliged to retain the canula for the rest of his life.

With respect to the further treatment of cicatricial stenosis, it is not my practice to *invariably* perform a preliminary tracheotomy as is counselled by Schroetter, but it is decidedly advisable to have all instruments for that operation ready to hand whenever attempts are made to divide a cicatricial web by a cutting instrument, or to dilate the narrowed orifice by bougies or analogous measures carried on through the natural passage.

Direct treatment of membranous stenoses of the larynx, whatever their nature, by surgical means is very tedious, and often very discouraging; but this is especially the case when the web is the result of syphilis.

Although isolated cases more or less successful had from time to time been reported, even in pre-laryngoscopic literature, there can be no doubt that to [11] Schroetter, of all others, is due the merit of perseverance in systematic dilatation by means of tubes and hollow catheters of gradually increasing dimensions passed from above, tracheotomy having been previously performed. The tubes are directed to be retained in position for from fifteen to thirty minutes. Schroetter has reported several successful cases, and others have occurred in the practice of various surgeons, especially [12] Hering of Warsaw, who is an enthusiastic follower of Schroetter's method, and has contributed a valuable essay on the subject. The process is, however, very slow, and involves in some instances a constant treatment of eighteen months or even longer, and, in the majority of cases, the wearing of a canula for life. [13] Stöerk uses a dilator which is attached to the upper part of a tracheotomy tube, distension of the constriction being thus made from below and without the passage of any instrument by the mouth. [14] Navratil has invented an elaborate dilator for rapid dilatation, but this treatment is no more successful in the larynx than in the urethra, and is attended by similar risks of acute inflammation. [15] Whistler, in an interesting and complete monograph, has

drawn attention to the fact previously noticed by [16]Liston and [17]Trendelenburg, and in accordance with everyday experience, that long retention of a tracheotomy tube is often attended by a certain amount of collapse of the larynx, and by atrophic paralysis of the dilating muscles of the glottis. Partly on this account, and partly for obtaining more permanent results than are usually afforded by simple distension, Whistler 'devised an instrument which should combine the properties of a knife and dilator in one.' This laryngotome (Fig. CXXXVI.) is composed of an almond-shaped

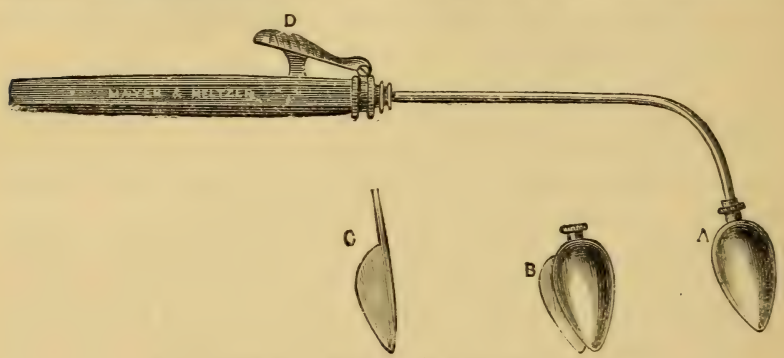


FIG. CXXXVI.—WHISTLER'S CUTTING DILATOR.

dilator (A) within which is a concealed blade (C). This blade is reversible, so that it may divide a stricture either at the anterior or posterior commissure of the larynx, and it can be pushed forward (B) when required by means of a lever attached to the handle (D).

I have myself employed Whistler's instrument in two cases; in both there was considerable improvement, and in one complete and permanent relief. The following are the chief features of the first case:

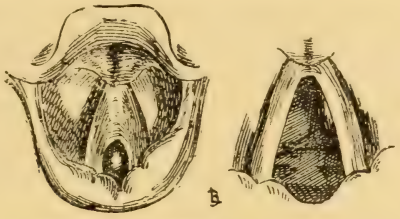
Sarah S., æt. 37, married, applied at the hospital on April 27th, 1885, on account of loss of voice, which had existed for fifteen months, and more recently a sense of suffocation and of an obstruction in the throat which had occasioned some difficulty in swallowing.

Her family history showed that her father died of phthisis. She herself had had five children, three of whom were living: one had died from bronchitis, and one as the result of an accident.

Examination of the larynx (Fig. CXXXVII.) showed an inflammatory cicatrix along the cushion of the epiglottis, and a tight fibrous band uniting the vocal cords along the anterior two thirds of their free border, and reducing the glottic chink to the size of a goose-quill. The left vocal cord was inflamed, and the left side of the larynx generally was thickened. Her respiration was audibly harsh and whistling, but regular during the day; there was dyspnœa on slight exertion, and at night, even during sleep, there was loud inspiratory stridor. Slight dulness was found over both apices of the lungs, with prolonged and high-pitched expiration. She had lost flesh lately, and her weight on admission was 96 lb., her height being about 5 feet 1 inch.

She was ordered to wear a Leiter cold coil over the larynx, to inhale benzoin and chloroform (Form. 30) three times a day, and to take 10 grains of iodide and bromide of potassium also three times daily, with a larger dose of bromide at night. Later she was ordered nightly inunctions over the larynx of mercury and belladonna ointment (Form. 79).

Whistler's dilator was employed twice a week, a large cotton-wool probang charged with sulphate of copper being passed through the constriction on intervening days.



FIGS. CXXXVII. AND CXXXVIII.—CICATRICIAL STENOSIS BEFORE TREATMENT. THE SAME AFTER USE OF CUTTING DILATOR.

The improvement in her larynx in six months is represented by Fig. CXXXVIII. At this time her voice had returned, but was still hoarse. Her breathing was easy and quiet, both night and day. She had gained in strength and in weight, and continued to attend from time to time as an out-patient.

Although in this case there was no direct history of syphilis, the result of treatment leaves little doubt as to the nature of the trouble.

Being of opinion that the difficulties of passing tubes into the larynx, and especially through a cicatricial stricture, are much greater than is generally stated, I have had constructed an instrument which combines the advantages of the hollow tube of

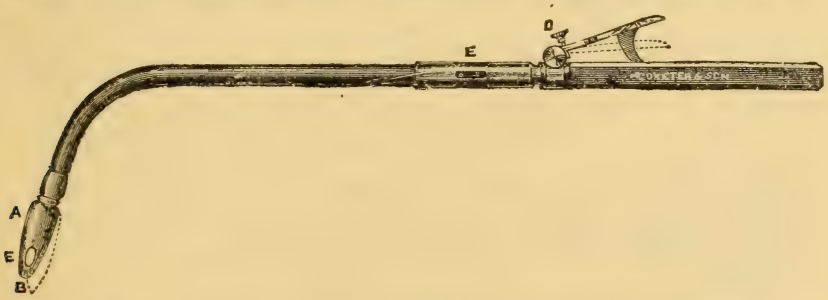


FIG. CXXXIX.—AUTHOR'S HOLLOW LARYNGEAL DILATOR WITH CUTTING BLADE (ONE-THIRD MEASUREMENTS).

A, terminal of the hollow dilator, containing the cutting blade (B), the extent of which is regulated by the screw at D. E E show openings for passage of air.

Schroetter and the cutting dilator of Whistler. Thus the surgeon while always sure, by the outward passage of air, when the hollow instrument is in the larynx, is able to incise with more certainty as to what he is cutting, and moreover in case of spasm the air-passages are not entirely obstructed. This instrument, which is

figured above, requires no description. It is no longer than Whistler's, and, like his, the cutting-edge of the blade is made reversible; in addition, the amount of blade can be regulated by the screw at D. The instrument has been used with satisfactory results in the later stages of the case reported at page 312.

Unsatisfactory though the results of cutting and dilatation of chronic laryngeal and tracheal stenosis undoubtedly are, I am fully in accord with Whistler that medication by drugs is entirely useless; though in the case of *recent* stenosis—glottic or subglottic—iodides and mercury occasionally give good results.

Where dilatation failed, I would certainly prefer a **tracheotomy** to resection of a portion of the larynx as practised by Heine, Bruns, and others.

There are two stages of *syphilitic laryngitis* — I might add *tracheitis* — in which the question of tracheotomy has to be considered. The first, that of acute œdema, which is so common an occurrence in the earlier tertiary period. This œdema may occur during the ulcerative process, or it may be due to development of a gumma, or to perichondritis, and will often, as has already been indicated, be reduced by prompt and appropriate constitutional measures, and in no disease will the surgeon who uses the laryngoscope both intelligently and diligently have more gratifying reward for patient watching and perseverance in treatment. Of such a fact the experience of all specialists will afford example.

I will mention one of several, in which a patient—I need hardly say a hospital one, for private patients are seldom so constant—has attended me weekly or fortnightly for about fifteen years. Twice he has been taken to a general hospital and threatened tracheotomy, but he has been now free from acute attacks for nearly ten years. He is the subject of more or less glottic stenosis, for which he is treated by the passage of a large cotton wool brush, charged with a solution of sulphate of copper.

Supposing a tracheotomy to be called for in such a case of œdema, there is a reasonable hope that the tube may shortly be dispensed with. A pea-valve may always be very early employed, and the sooner an orifice is made in the upper aspect of the tube the better.

Some years ago I saw in consultation and assisted in the operation and treatment of a colonel in the army, under the care of Mr. Nunn, in which case, after three months and for a period of nine, the patient gave the word of command with the tube in his throat, and was enabled to dispense with it permanently at the end of a year.

The second phenomenon in the course of a syphilitic laryngitis, for which tracheotomy is indicated, is that of stenosis, and this is usually infra-glottic in position. It occurs at a quite late period, ten, fifteen, twenty, or even thirty years after primary infection,

and is due either to deforming cicatrices or to the deposit of fibroid tissue at situations not necessarily the seat of previous ulceration. Without doubt these cases are becoming less frequent, and will become still more rare, as the use of the laryngoscope and *topical** laryngeal medication becomes more general. They are at the present day much more uncommon in the United Kingdom than in Austria-Hungary and Poland: whether this circumstance is due to causes racial, climatic, hygienic, or dietetic—I speak more especially of the use of raw spirits—is not now a question to be considered; but it is important to note that the treatment adopted also differs essentially, or at least yields very different results. I suppose few of us can claim many such cases of sub-glottic and tracheal stenosis as are reported by Schroetter of Vienna, Navratil of Buda-Pesth, or Heryng of Warsaw. I confess that I have seldom had a case in which attempts at mechanical dilatation, *without cutting*, have not rather increased the distress and precipitated the tracheotomy by promoting suffocative spasms of a serious grade; nor have I, after opening the windpipe, been much encouraged to persevere in mechanical dilatation with any hope of being able to remove the tracheotomy tube. I believe it to be better—certainly more humane—surgery whenever we are convinced that there is an obstinate stenosis due to syphilis, to perform an early tracheotomy, and to advise a life-long retention of the tube. I have only to add that the lower the tracheotomy can be made in such a case the better, for nothing is more deceptive than the apparent high situation of a stenosis as viewed by the mirror, and nothing more distressing than the disappointment so frequently experienced of finding that our tube has not reached the stricture, or if it has relieved an upper one, its introduction has been rendered useless by the existence of another at a lower level.

[18]O'Dwyer has reported five cases in which it has been serviceable in the adult. His tubes for the purpose are constructed of metal, similar to those for children, the large ones of vulcanite, and they have been worn for periods varying from a few days to several months—in one case ten. Deglutition is comparatively easy after the first day or two. Dr. O'Dwyer kindly gave me the first instruments he had made for this purpose, and I have employed the method, with encouraging results, in two cases.

* The word 'topical' is emphasized here because while I am ready to admit that many cases of syphilitic inflammation and ulceration in the larynx can be healed by appropriate general treatment alone, it is only by carefully directed topical applications that deforming cicatrization so generally the result of the healing process can in any degree be controlled.

In some cases the contraction is in the trachea, and is seldom then within reach of the surgeon. Such a condition may be due to compression by enlarged thyroid or other glands, by an aneurism, or other new formation, or may be caused by interstitial thickening, of which the two principal causes are syphilis and rhinoscleroma. In the former cases, while incision is contraindicated, dilatation is useless, and even dangerous; in any circumstance, division is sure to be followed by but very partial and temporary relief.

CONGENITAL SYPHILIS OF THE LARYNX.

In my remarks on 'Congenital Syphilis in the Pharynx' (p. 208), I have referred to the classical essay of [18]John N. Mackenzie as the first means of attracting attention to this important and hitherto unexplored subject; but independently of that circumstance, it will, on its own merits, always stand as a permanently valuable addition to our knowledge of laryngeal disease, and, as such, it will repay for careful perusal. There is doubtless much force in the conviction of this author, 'that laryngeal lesions (in connection with congenital syphilis) have not been found more frequently, simply because they have not been sought;' but I am bound to say that in the seven years which have elapsed since his article was written, the joint experience of my colleagues and myself has failed to confirm his postulate 'that laryngeal disease is not rare in congenital syphilis; that it is one of the most constant and characteristic of its pathological phenomena; and that we may look for invasion of the larynx with as much confidence in the congenital as in the acquired form of the disease.'

On the contrary, while readily conceding that many cases of *chronic superficial laryngitis*, as well as of *relapsing tracheal and bronchial affections in infantile life*, are much more often associated with the syphilitic dyscrasia than is generally suspected, we do not see *chronic interstitial laryngitis*, nor *deep, destructive, ulcerative laryngitis*, as ordinary, frequent, or in any sense typical evidences of congenital syphilis; though cases exhibiting characteristic appearances in the palate and naso-pharyngeal regions, whether as early or tardy evidences of congenital syphilis, are of almost daily occurrence in our practice.

[19]Monti states that he has twice seen laryngeal syphilis, which arose during intra-uterine life; but, looking at the absolutely passive part played by the organs of respiration previous to birth, such a circumstance must be very rare, and the same may be said of so-called congenital webs, hyperplasiæ, and papillomata in the larynx and trachea.

It is admitted by John Mackenzie that 'the classification of the laryngeal lesions of congenital syphilis with secondary and tertiary will not obtain as in the case of acquired disease;' and in this respect they correspond with what we find in the pharynx, deep destructive forms of ulceration being not infrequently the first indications of specific mischief in either region.

Age is an important factor both of *etiology* and *prognosis*. Two-thirds of the cases reported occurred within the first year of life; and as to the issue, the younger the patient the more certainly and rapidly fatal is the malady. *Diagnosis* must generally depend on correct recognition of *functional symptoms*. The *voice* and *cry* exhibit all grades of phonetic impairment from slight huskiness to the toneless whisper of absolute aphonia, with a resulting chronic and permanent hoarseness. *Cough* is frequent, raucous, and paroxysmal, and is unaccompanied by much expectoration. *Respiration* is seriously embarrassed, and *deglutition* is often difficult, and may be painful. *Laryngismus* is noted by John Mackenzie as a not infrequent result of congenital syphilitic laryngitis. These symptoms may to some extent be caused by pharyngeal mischief; and there may also be concurrent cutaneous manifestations.

In the absence of objective verification, laryngoscopic examination should always be attempted, and is not seldom successfully effected by the expert.

I was recently enabled to see and to demonstrate the larynx of a child, aged only 8 months, whom I saw in consultation with Dr. Macfee, of Limehouse.

In any case exhibiting the symptoms thus most cursorily sketched, we need not waste time in seeking for confirmation of our diagnosis by attempts to elicit corroborative evidence from the parents, but should at once attempt a treatment which will be happily efficient if the case is specific, and is at least harmless if that dyscrasia is wanting. Local mercurial inunction over the larynx, the administration of grey powder in small and frequent doses, and, where the symptoms are acute, vigorous administration, even to iodism, of the iodides of potassium or sodium, are the measures on which we must rely. If the naso-pharyngeal region is obstructed, nasal douches of boracic acid, and the passage of a brush through the inferior meatus, will often greatly relieve respiration; but should all our efforts not be attended by prompt and sensible benefit, I fully agree with John Mackenzie that early *tracheotomy*—that is, within forty-eight hours from the first onset—is to be advocated. It is probable that *intubation* would be attended by success in this class of case.

Wherever infantile laryngitis occurs in a syphilitic subject, recurrence is to be apprehended on very slight aggravating causes. All measures of *prophylaxis* as to exposure to damp and cold must, therefore, be rigorously enforced for the first seven or eight years of life, and constitutional medical treatment be systematically pursued.

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CHAPTER XIX.

TUBERCULOUS LARYNGITIS.

(Figs. 68 to 76, Plate VIII.; Figs. 101, 104, and 105, Plate XI.; and Figs. 106, 107, and 108, Plate XII.)

Synonyms.—Laryngeal phthisis; Throat consumption.

'That evidence of the tubercular diathesis influences a local laryngeal inflammation in a manner eminently characteristic, and at a period long prior to the discovery of equally well-marked symptoms in the lungs, is a fact which the daily observation of those engaged in laryngeal practice establishes as incontrovertible. Whether or not there be tubercle actually developed in the larynx, or what indeed is the nature of tubercle wherever developed, the author does not presume, and indeed does not care, to decide. Seeing, however, that tuberculosis is a disease primarily manifesting itself more especially in the respiratory organs; seeing that catarrh is one of the most frequent excitants to that disease, and that many catarrhal inflammations of the lungs commence in the larynx, it is at least fair to infer that, in those cases in which the eye reveals what has come to be recognised as tuberculous laryngitis before the ear detects the presence of tubercle in the lungs, the disease has primarily attacked the former organ. Not only so, but noting also that the morbid changes in the larynx, as physically evidenced in every stage, are quite different from those of simple catarrhal, and of syphilitic, to say nothing of exanthematous and other phlegmonous inflammations, it is not unreasonable to suggest that the factors are also of an equally distinctive character.

'It is quite certain that the pale, opaque tumefaction of the arytenoid cartilages and of the epiglottis in laryngeal phthisis has not the clear transparency of serous œdema, the active glandular inflammation of simple laryngitis, the hyperplastic infiltration of syphilis, or the angry inflammatory irritation of carcinoma. Nor

is the consequent ulcerative process less distinctive; there is no erosion, nor deep excavated circumscribed ulcers, followed by narrowing cicatrices; nor new formations taking on an ulcerative process, but a true carious degeneration, causing loss of tissue, which, commencing superficially at small points, leads to universal destruction of the deeper parts, without extension to neighbouring glands, and with but feeble, if any, attempt, under treatment, at a reparative process.

'It is, therefore, surprising that we should be told, with reference to laryngeal phthisis, on the one hand, that "tubercle appears to play a very secondary part, if any part at all," in its production (Mackenzie); and on the other, "that neither the catarrh nor the ulceration of phthisical subjects presents any characteristic signs by which it could be recognised as such, [and that] the attempts made to establish pathognomonic peculiarities cannot be said to have succeeded" (Von Ziemssen).

'We prefer to adopt the view of Virchow, who just exactly recommends the larynx as the most appropriate place for the study of true tubercle.'

The foregoing words, with which I commenced this chapter in my former edition, were written nearly ten years ago. Three years later, in conjunction with [1]Dr. Dundas Grant, I reported amongst others two cases which illustrated the probability that the throat can be attacked primarily with tubercle. One was entitled 'Tuberculous ulceration of the tongue two years and a half prior to laryngeal or pulmonary manifestations;' the other, 'Tuberculous disease of the gums and fauces nearly three years prior to laryngeal or pulmonary evidences;' but, as we then stated, the fact that there can be tuberculous disease in either pharynx or larynx could not be definitely settled until an opportunity should arise of dissecting subjects of tuberculosis in the throat in whom there were no evidences of disease in the chest. Since that time this event has occurred. [2]Demme has reported the case of a boy, aged four and a half years, who died of tubercular meningitis; the necropsy showed the presence of laryngeal ulceration *with tubercle bacilli*, the thoracic and abdominal organs being at the same time free from tubercular disease. Many other cases similar to our own in which such a condition was suspected have also been recorded; and it may now be considered as an accepted fact that primary tubercular disease may not only attack the larynx, but may even cause death, without the lungs becoming affected.

We may therefore for the future consider tuberculosis of the

larynx as a *primary* disease, to be studied with equal interest from the aspects of pathology, diagnosis, prognosis, and therapeutics. Notwithstanding, I do not for a moment contend that laryngeal phthisis is not generally *secondary;* nor must it be forgotten that in tuberculous patients a laryngitis may occur which is non-tuberculous—that is to say, one which does not depend upon the presence of tubercle in the larynx—and such a laryngitis offers little to distinguish it from an ordinary inflammation, except that it is less amenable to treatment.

[3]Beverley Robinson, in an able paper, insists on the *non*-tuberculous and essentially catarrhal character of 'the very large majority, if not all, of the laryngeal conditions which are encountered in pulmonary phthisis, and which have a more or less direct relationship with the march of the disease in the lungs.' In this view he is opposed to most observers on this side of the Atlantic, and to many of his own countrymen; but there is much force in the arguments he adduces in favour of the probably greater frequency of purely catarrhal conditions of the larynx in American subjects of pulmonary tuberculosis. In this connection it is to be remarked that considerable differences exist in the characters of many other laryngeal diseases in different countries. Laryngeal neoplasms, for example, are probably more frequent in France than in England; and my own experience is decidedly in favour of chronic stenosis of the larynx being much rarer in this country than it is in Austria, Hungary, and Poland.

A case recently occurred in the hospital practice of my colleague, Dr. Orwin, in which there was extensive tuberculous destruction of the soft palate. On post-mortem examination the lungs were likewise seen to be profoundly diseased, but with the exception of *slight* thickening of the epiglottis the larynx was free from any tuberculous implication.

[4]Gottstein also quotes an instructive example of a very similar character in illustration of the non-tubercular nature of intercurrent laryngeal catarrh during the progress of a case of pulmonary consumption. The patient was a member of his own family who died of phthisis:

So long as the pulmonary symptoms were slight, he suffered from repeated attacks of obstinate laryngeal catarrh with aphonia. Though the pulmonary disease advanced, the larynx remained unaffected up to the time of death, while a tubercular otitis and tubercular ulceration of the septum of the nose, which resulted in perforation, developed.

Tuberculous laryngitis is seen in both the *acute* and *chronic* forms. The first is generally due to exposure to the ordinary causes of inflammation, and may be *primary;* the second is always *secondary* to other manifestation of the dyscrasia.

Etiology.—The predisposing causes are, of course, those which are found to obtain in the production of tubercle generally. There is the invariable element of a low state of vitality, either hereditary or acquired, with a resulting feebleness of recuperative power. Those exposed to catarrhal influences are more liable to have the larynx primarily attacked. We thus find it much more frequent in the male sex than in the female, the proportion being as three to one. As a further proof of the importance of this factor, temporary improvement is often found to take place in summer or on favourable change of residence, this result being more constant and pronounced in the larnygeal than in the pulmonary form of the disease. Experience does not seem to prove that functional activity is by any means an invariable predisponent, but there are sufficient cases on record to illustrate the occasional occurrence of such a cause, and we have personal experience of a failure of voice in the person of professional 'voice-users,' as clergymen, teachers and auctioneers, as the forerunner of local manifestation of tuberculosis in the larynx. On the other hand, any cause for debility of the general system (as, for example, in women, amenorrhœa, or other uterine disturbance), which leads to the production of the so-called functional or nervous aphonia, is, quite independently of professional use of the voice, a not uncommon premonitor of throat consumption. In such a case there will appear no disease in the larynx beyond a loss of adductive power in the vocal cords, and some paleness of the mucous membrane, explained by the general condition; while the lungs, although insufficiently expanded, and of somewhat diminished resonance, may be pronounced free from disease. Local treatment of the larynx by stimulating inhalations and by faradization may restore the voice, which is, however, soon lost again. Tonics, change of air and of scene, are of no avail, and at a period varying from a few months to perhaps a couple of years, undoubted phthisical symptoms develop themselves.

As to the *frequency* of laryngeal tuberculosis and its relation to pulmonary disease of the same nature, [5] Heinze in his exhaustive monograph states that among 4,486 consecutive autopsies made at the Pathological Institute of Leipzig, pulmonary phthisis was the cause of death in 1,226 instances, and of these 51·3 per cent. had ulcerations in the larynx. He says further, and this is of great interest in connection with our present subject, that *ulcerations were never found with tuberculosis of other organs when the lungs were intact.* We have already recorded an exception to this state-

ment in the experience of Demme, and it remains to be seen whether that exception may not in time become somewhat less exceptional.

As to the influence of *sex* and *age* in laryngeal tuberculosis, Heinze's statistics agree in general with those of Willigk, Ziemssen, and others; as to the first, the proportion of males to females attacked by the disease is as near as possible as three to two; in regard to age, the maximum frequency exists in individuals between twenty-one and thirty years of age, the minimum under one year.

Pathology.—The morbid anatomy of tubercle in the larynx differs only from that in other situations in relation to the difference of the structures which are attacked. I shall not attempt to give a *résumé* of even a tithe that has been written on the subject, but will briefly refer, first, to the naked-eye appearances as seen in life by the laryngoscope, and then post-mortem; and secondly, to the more important histological features.

The tuberculous process, as witnessed in the larynx, is characterized by—(1) Anæmia; (2) Infiltration and tumefaction; (3) Ulceration; (4) Necrosis or caries; (5) New formations.

1. **Anæmia.**—I was formerly inclined to look on 'a very decided and general pallor of the larynx'—to quote the words of [6]Sawyer—as a much more constant indication of early local changes than I have with further experience found to be the case, and there are undoubtedly a considerable number of instances in which the disease begins with a hyperæmia. The explanation of these apparently contradictory conditions is afforded by [7]Cohen, who says, 'The earliest recognisable stage of the *acute* form is almost always manifested by marked *congestion* of the mucous membrane. The earliest recognisable stage of the *chronic* and much more frequent form, is almost always manifested by marked *pallor* of the mucous membrane.'

2. **Infiltration and Tumefaction.**—This may be considered the first invariable characteristic of laryngeal tuberculosis; it may be general, but is much more frequently partial. The general seat of earliest infiltration is the inter-arytenoid space, the coverings of one or both of the arytenoid cartilages, and the ary-epiglottic folds; but I have often seen swelling of the epiglottis itself precede any other local change, while in patients whose profession involves much exercise of the voice the swelling may first be seen in the vocal cords and ventricular bands. The tumefaction is by no means generally caused by true serous œdema, although it presents

many characters thereof, but it is due to tuberculous infiltration in the sub-epithelial layer of the mucosa, and in the superficial portion of the sub-mucosa. Nevertheless, as [8]Gougenheim has pointed out, 'this tumefaction, which to all appearance is so considerable and so rigid during life, diminishes notably after death. And this fact has led to much misconception as to its nature. The same author has usefully drawn attention to the fact that when perichondritis and caries take place in the course of a laryngeal tuberculosis, true œdema may occur; but this circumstance is one of comparative rarity, and is less likely to lead to suffocative stenosis than in other forms of œdema.

[9]Fraenkel has shown that tuberculous infiltration may extend to the laryngeal muscles. Heinze, however, doubts its frequency, and only found the condition twice in fifty cases. The **laryngeal paralyses**, especially of adduction, that are sometimes seen in laryngeal tuberculosis, may be due to this cause, but are more frequently explained by a simple mechanical impediment to movement of the crico-arytenoid articulation as the result of a general infiltration of the joint. Neither true anchylosis nor luxation of this articulation is of common occurrence in laryngeal phthisis. In frequent instances the paralyses are the expression of general weakness, the expiratory volume of air in the lungs being insufficient to produce due vibration of the cords. In other cases a more or less temporary paresis may be induced by intercurrent catarrhal inflammation. Unilateral and abductive laryngeal paralysis in phthisis is more frequent on the right than the left side, and may then be due to compression of the right recurrent nerve by pleuritic adhesions, or consolidation at the apex. The same nerve may become involved in enlarged bronchial glands on either or both sides. And lastly, abductive paralysis, either uni- or bi-lateral, may, equally with loss of adductive power, be due to intrinsic disease of the dilating muscles.

3. **Ulcerations** of laryngeal phthisis are characterized by their small size, multiple character, and their tendency to coalesce and to extend laterally rather than to penetrate deeply. I cannot say that I have seen much variation in their shape in different situations, as mentioned by Cohen, except that on the vocal cords they have a less carious, mouse-nibbled appearance. As before mentioned, erosions, non-tuberculous in character, may appear in the larynx of a tuberculous patient, the subject of a fortuitous catarrh. Doubtless some of those that heal under treatment are of this nature.

Concerning the *character* of the laryngeal ulcer, the material for Heinze's observations were fifty patients from amongst those who died with pulmonary phthisis during the year 1876 at the Jacob Hospital; and the only basis for a choice of cases was that the throat should be in some manner abnormal. Of this number forty-nine presented ulcerative process in the larynx, and one an intense catarrh, but no ulceration. Heinze further discovered that of these forty-nine cases, the ulceration was tuberculous in 83 per cent., and in 17 per cent. non-tuberculous. It will thus be seen, that according to this painstaking observer the great majority of ulcerations in phthisical patients are of tuberculous character; and moreover he affirms that whenever tubercle could not be found, the loss of substance amounted to merely an erosion of the mucous membrane similar in character to the *aphthous*, or, as Virchow has called it, the *lenticular* ulcer, which has been observed not only alongside of tuberculous ulcers, but even alone in phthisical individuals as well as in the throat affections of the various exanthemata.

[10] John Mackenzie, in allusion to these so-called *aphthous erosions* of the older writers, describes them as *diphtheritic ulcerations*, occurring in laryngeal phthisis. They are most common in the trachea, but 'are met with less frequently in the larynx and pharynx. In the former they select the laryngeal aspect of the epiglottis, the anterior surface of the arytenoid cartilages, and the inter-arytenoid fold as their favourite seats. In the pharynx he has seen them most frequently in the pyriform sinuses, where they sometimes assume a considerable size. Their occurrence here is most probably explained by the accumulation in these cavities of irritant sputa.' This author believes that their anatomical appearances, which he describes with his usual care and minuteness, 'leave no room for doubt that these ulcerated areas are the result of a circumscribed superficial diphtheritic inflammation of the mucous membrane; that is to say, an infiltration of its tissues with so rich and rapid cell-proliferation as to eventuate in necrosis and sloughing of the superficial layers.'

While fully agreeing with the accuracy of this observation, as well as with the details of the description, I cannot forbear an expression of opinion that the use of the word *diphtheritic* in this connection is unfortunately misleading, and much less happy than the old term *aphthous*, or the more modern one of *corrosive*, or *infective*. If a change were desirable, the word *membranous* would accurately and without risk of confusion describe the condition referred to.

There has been, since the time of Louis, considerable speculation and much discussion as to the infective power of the sputa of phthisical patients with cavities in the lungs to produce laryngeal manifestations, and since the discovery of the tubercle bacillus this view has obtained renewed favour. It cannot, however, in our judgment be maintained, first because our daily clinical ex-

perience gives proof that not only tuberculous ulceration, but the tubercle bacilli are to be found in both pharynx and larynx, with almost negative, or at least only incipient, pulmonary symptoms; and also because laryngeal evidences are often absent in cases in which there are extensive cavities in the lungs. Moreover, tuberculous infiltration, which is one of the earliest and an invariable manifestation of the disease, may proceed to even an extreme stage without there being any breach of surface.

Another subject of speculative interest, which may here be conveniently alluded to, is the importance which is to be attached to the **tubercle bacillus** as an indication of the tuberculous process. On this point [11] Hunter Mackenzie has contributed valuable information, and as a result of the careful examination of seventy cases, reports 'that in laryngeal tuberculosis the bacilli are always in excess.' Unfortunately, however, this evidence is only constant in cases in which the symptoms and the physical evidences on laryngoscopic and stethoscopic examination leave no doubt as to the nature of the disease, so that the diagnostic testimony of the presence of the tubercle bacillus is but corroborative. It is, moreover, admitted that 'its prognostic value cannot be determined with accuracy, inasmuch as it may be as abundant in a comparatively slow non-febrile case as it is in a more acute and febrile one.' These conclusions are in exact accordance with the results of the examinations for the bacillus, which have for some time been systematically pursued, in every case of even suspected phthisis that has occurred in our hospital practice.

4. **Necrosis and caries** may attack any of the cartilages of the larynx, and are probably much more common than is generally supposed; for on the authority of Heinze, though extrusion of portions are not of very frequent occurrence during life, evidence of this fact is rarely absent on autopsy. Reference to the post-mortem appearances and the descriptions appended to Figs. 104 105, and 108, PLATES XI. and XII., sufficiently attest the accuracy of this statement.

Beverley Robinson, in the article already referred to, denies the frequency of abscess in relation to the perichondrial changes in laryngeal phthisis, with which view I entirely agree; but I am bound, as the result of an extended experience derived from post-mortem examinations, to differ as completely from his view that 'the instances are rare indeed in which the cartilages in this disease become either carious or necrosed.' I believe the exact converse to be the fact, at least as we see the disease in this country.

5. **New growths** (Fig. 72, PLATE VIII.), in connection with tuberculous laryngitis, may occur in all portions of the larynx,

and are of the nature of—(1) *granular hyperplasiæ*, or *granulomata*. According to [12]John Mackenzie, to whom we are again indebted for systematized description of these tubercular tumours, the variety under notice is 'anatomically allied to granulation tissue, and may be regarded as representative of a connective process —*as a natural step towards cicatrization*.'

(2) *Papillomatoid* or wart-like *excrescences* are of less frequent occurrence. They are generally to be found on the posterior laryngeal wall, and [13]Stöerk maintains that their presence in the inter-arytenoid fold is an infallible sign of incipient tuberculosis; [14]Mandl also attached considerable diagnostic importance to their presence: I think, however, that they are quite as often seen in connection with syphilis, or even in chronic laryngitis independently of any specific dyscrasia. In each there is a distinct histological character differentiating them from each other, and from true papillomata.

(3) *Solitary tumours* of the windpipe, which are truly *tubercular* in character, were also first noticed by John Mackenzie. Two specimens are described, and are believed by that author to be unique—they must certainly be of great rarity.

'Such tumours doubtless have a similar origin to the so-called "metastases" in the laryngeal mucous membrane, which take their departure from old tubercular disease of other organs, as the kidney ([15]Köhnhorn) and bronchial glands ([16]Lennox Browne).'

The post-mortem appearances of a larynx affected with laryngeal tuberculosis cannot perhaps be better given than by description of what was seen in three typical cases already reported by Dundas Grant and myself; the appearances in two of them are appended as coloured illustrations to this work in PLATES XI. and XII. It will be seen that almost every condition to which I have referred as occurring during life is verified in one or other of the examples.

The first specimen was taken from the body of a man, æt. 36, who was admitted into the Central Throat and Ear Hospital in September, 1878. He had suffered with winter cough and hoarseness for three and a half years; dysphagia, and almost complete loss of voice, for two and a half years.

In life his larynx presented the following features (Figs. 106 and 107, PLATE XII.): Mucous membrane very pale; epiglottis apparently normal; around both arytenoids there was considerable swelling, both more marked on the left side; the surface of the inter-arytenoid fold, the left ventricular band, and left vocal cord, were covered by an irregularly connected granular ulceration. The active adductive power of the left cord was greatly impeded by the mechanical obstruction of the swollen arytenoid cartilage.

The *autopsy* revealed very advanced disease in the lungs, and the following laryngeal changes (Fig. 108, PLATE XII.):

The mucous membrane generally was exceedingly pale. Epiglottis, normal in size and form, but presenting on its laryngeal surface several small follicular elevations. There was much irregular thickening of the ary-epiglottic folds, and the mucous membrane over them was loose and baggy. Over both cornicula and arytenoids the mucous membrane presented a tuberculated appearance, the elevations being of a greyish colour, and of the size of pins' heads. The right ventricular band contained in its posterior two-thirds a dense material of almost cartilaginous consistency, extending from above the vocal process forward. The left ventricular band was almost completely removed, and covered by a weak-looking ulcer, with irregular elevated margins, and a rough but slightly elevated granular floor, the anterior half of the base of the ulcer being densely indurated. There was great thickening of both vocal cords, notably of the middle third of the left one.

On the inner aspect of the right arytenoid cartilage there was a curious excavation, and the vocal process was ossified, bare and rough. The joint presented a slight degree of eburnation. The upper portion of the left arytenoid cartilage down to the level of the vocal process was converted into a rough calcareous nodule about the size of a small pea. It lay loosely in the surrounding soft tissues, and rested on the lower part of the cartilage, which was rough, gritty, of a brown colour, and only held in position by the vocal cords, the joints being completely disorganized, and the articular surfaces quite carious.

Examining the cricoid cartilage, there was found on the right side of its summit, internal to the crico-arytenoid joint, a portion so hardened as to resemble more than anything the structure of dentine, with a cavity in it of the size of a millet-seed, and very suggestive of that of a carious tooth.

The cartilages were all in a prematurely advanced state of ossification.

Under the microscope, a vertical section through the left cord and the ulcer on the left ventricular band, showed that all the structures were infiltrated by a quantity of small round cells, the grouping of which bore unmistakable resemblance to recognised types of tubercular material, albeit that giant-cells, forming the centres of the groups of leucocytes, could not be distinctly made out.

In another case, a male, aged 29, treated in April, 1880, in whom laryngeal manifestations were also developed after evidence had been afforded of pulmonary phthisis :

Post-mortem examination showed the following state of matters. Of the epiglottis only the lowest fifth remained as a mere stump, with a very irregular eroded margin. The tissues over the arytenoid cartilages were much increased in bulk. The vocal processes were eroded and bare, each lying in the centre of an ulcer.

A pale, shallow ulcer, with well-defined margin, extended over the whole of the inner wall of the larynx, from the edges of the ary-epiglottic folds, down to the mucous membrane of the trachea. The floor of this ulcer had a peculiar worm-eaten appearance, and was thickly beset with small elevations like grains of semolina. These, when picked away, consisted of a yellow, crumbly, and gritty tuberculosis-looking matter, leaving behind small apertures, apparently the mouths of gland-ducts, since the material under the microscope was seen to consist of epithelial and pus cells in all stages of fatty degeneration. The ventricular bands were much thickened, almost occluding the ventricles. The vocal cords were in a similar condition; the cartilages were mobile, and apparently healthy.

Microscopical examination of a section through the anterior part of the ulcer on the left side of the larynx revealed the presence of tubercular infiltration, as evidenced by the existence of a fine cell-material, arranged in masses in which giant-cells could be recognised.

The last example differs from the preceding, inasmuch as tuberculous ulceration of the tongue had occurred two and a half

years prior to either laryngeal or pulmonary manifestations. The patient was a male, aged 48 years, admitted into hospital in January, 1879, with a history clear of suspicion of syphilis.

On local examination during life the objective signs were:

(*a*) *Tongue* (Fig. 102, PLATE XI.) pale, flabby, indented, and on it two pale, shallow ulcers, with small grain-like elevations on their floors, and having slightly raised irregular margins. Of these ulcers one was situated on the under surface of the left side, near the lip; the other on the right side, about midway in its length,

(*b*) In the larynx, as seen with the mirror (Fig. 101, PLATE XI.), there was observed congestion of the epiglottis, with ulceration on its laryngeal surface, especially toward the right side. Over the right arytenoid cartilage the tissues were so swollen as to form a large pyriform tumour, occluding the greater portion of the right vocal cord. The left presented the same condition in a minor degree. The right ventricular band was much swollen. The whole larynx was bathed in a mucous fluid.

On *post-mortem* inspection (two months after admission), the advanced tubercular disease in the lungs, and the presence of scrofulous abscesses in the epididymes, etc., testified to the nature of his constitutional disease.

The ulcers on the *tongue* (Fig. 103, PLATE XI.) were changed, in so far as their edges had become pale and sodden-looking, and their floors presented a raw-meat appearance, the muscular fibres being laid bare, and all trace of the grain-like elevations having disappeared.

In the *larynx* (Figs. 104 and 105, PLATE XI.) the mucous membrane generally was pale. The epiglottis was much thickened, and on its free border, from a short distance to the left of the middle line down to the right ary-epiglottic fold, was an excavated ulcer, with rough irregular edges, and a pale, granular base. This ulcer extended over the greater portion of the right half of the laryngeal surface of the epiglottis, and down to the right ventricular band. There were also two other smaller ulcers of less depth, and somewhat oval in shape, on the left half and middle of the epiglottis respectively. The right ary-epiglottic fold was swollen out into a flabby, wrinkled, somewhat globular tumour. The left formed a less prominent swelling. Of the ventricular bands, the right was represented by a firm longitudinal swelling, concealing the ventricle. It was irregular in outline, of a soft semi-cartilaginous consistency, and quite movable on the subjacent cartilages. The left was normal. The right vocal cord bore on its posterior part, corresponding to the inner surface of the arytenoid cartilage, an ulcer extending into the adjacent part of the ventricle, and containing on its floor a portion of the arytenoid cartilage, which had become bare and rough. The left vocal cord was comparatively healthy.

The *microscopical* appearance in this case was that of tubercular infiltration of all the tissues involved.

SYMPTOMS: A. FUNCTIONAL.—**Voice.**—Failure of the voice is a very early and frequent symptom. As already remarked, this may be due either to local lesion or to insufficient motor power of diseased lungs. It may be quite early aphonic; more commonly, however, it is affected just in proportion to the amount of the local lesion; and the ordinary vocal symptoms of congestion, thickening or ulceration, already described at length when considering other forms of laryngitis, are witnessed.

The following is an instance of loss of voice as an early symptom of phthisis depending on (tuberculous) changes within the larynx:

G. T. M., aged 21, residing at Cardiff, and in training for a schoolmaster, came under my care on August 30, 1886, on account of loss of voice, without any other symptom of cough, night-sweats, or emaciation. The patient spoke with distinct hoarseness, which was worse after reading and towards the end of the day. With the *laryngoscope* (Fig. CXL.) it was seen that there was congestion, with weakness of adduction of both vocal cords, and that the right one was thickened and somewhat ulcerated. *Auscultation* demonstrated a small area of dulness at the left base, with vocal fremitus, absence of breath-sounds, and occasional rhonchus on forcible inspiration.

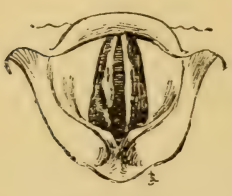

FIG. CXL.

On questioning him, it was elicited that he had had several severe 'colds' on the chest, with pneumonia of the left side, two years ago. A very unfavourable prognosis was given, and on recent inquiry (March, 1887) I learn that the patient, as anticipated, has been obliged to abandon his vocation, and that in the past severe winter his voice and general health have both continued to deteriorate.

There is a peculiarity in the voice of consumptives with laryngeal mischief not generally noticed: this is found in the rapidity with which the voice changes in character during a quite short conversation, from a gruff hoarseness to a high falsetto, which as quickly passes into a toneless whisper. These changes are probably influenced by lodgment and dislodgment of secretion, and also by peripheral nerve-irritation affecting the tension of the cords. A somewhat similar though, to the practised ear, distinct condition is occasionally noticed in patients with laryngeal growths, variation in the situation of which produces quick alterations in voice. In both diseases there sometimes occurs a true *diphthonia* or double voice—the cause being in the one under consideration the lodgment of mucus between the vocal cords during speech, and is not peculiar to phthisis, or it may be accounted for by a paresis. In the case of a growth in the larynx, it is the neoplasm itself which causes this peculiarity.

Respiration, although short and somewhat frequent, is not, as a rule, embarrassed in the early stage, but as tumefaction leads to mechanical loss of mobility, and the vocal cords themselves become thickened and ulcerated, extreme dyspnœa, with stridor and paroxysmal aggravations, may ensue. Stenotic suffocation is less marked in laryngeal phthisis than in other similar conditions, as of syphilis or cancer, whether it be due to the semi-solid infiltration of tubercle, or to the more rarely witnessed true œdema which may result from perichondrial and chondrial changes.

Cough is naturally a prominent and, on many accounts, a very distressing symptom in the advanced stages, whether it be caused by local or pulmonary lesions, since the mechanical irritation in the larynx produces most acute pain, and the cough paroxysms are followed by extreme prostration. At a very early period

the feeling of a desire to clear the throat of a foreign body predisposes to a worrying, unproductive cough. Expectoration is not copious, nor more than glairy in character, until suppuration is established. Hæmorrhages from the larynx, common enough in cancer and syphilis, are but rare in phthisis, even when there is advanced necrosis, and it is very difficult, even when suspected, to decide that the bleeding has originated in that region. Occasionally, however, the spot at which the vessel has given way can be seen.

In one instance (*vide* Fig. 69, PLATE VIII.), a recent clot was observed on the vocal cord after a very moderate hæmoptysis, in which there was but slight corroborative local evidence of laryngeal tuberculosis, nor would the result of stethoscopic examination have been sufficient to justify the grave prognosis suggested by the laryngeal appearance, and, unfortunately, verified by the subsequent history of the case.

Deglutition.—Difficulty of swallowing is by no means an invariable accompaniment of laryngeal phthisis, but when present it is, without doubt, the symptom which most tends to hurry on the fatal termination, and is the one on which account patients most frequently seek relief of the throat specialist. The trouble, at least in early stages, is mainly mechanical, from impediment to the mobility of the epiglottis, which causes fluids to pass downwards into the larynx, and backwards into the naso-pharynx. **Dysphagia** is first experienced only in taking fluids, but as soon as there is ulceration, and when there is extreme swelling of the arytenoid cartilages, or disease of the cricoid, attempts at the deglutition of solids, unless first artificially masticated and made bland, cause the act to be acutely painful. As a rule, semi-solid food and of tepid consistence is that most easily taken.

This symptom of **Pain** during the exercise of function is of great diagnostic value when there is the least idea that the disease may be syphilitic. When, however, the parts can be kept at rest from cough, or when the patient is not eating, it is surprising how little local pain is felt; here, again, differentiating this disease from carcinoma. In the early stages, moreover, there may be but little pain, and nothing more than a sense of discomfort or of a foreign body. In exceptionally happy cases, considerable disintegration of the tissues will go on without any further disorder of sensation. In some instances there is tenderness to external touch of the larynx at quite the commencement of the disease. Where there is perichondritis the skin and soft tissues covering this region are often swollen and inflamed, and are then intensely sensitive to any external manipulations.

B. PHYSICAL.—Most of the physical changes have been already alluded to in our remarks on the pathology. It remains to more minutely describe the typical laryngoscopic features.

Colour.—(Figs. 68, 74, etc., PLATE VIII., and Figs. 106, and 107, PLATE XII.) The first evidence in the mirror of laryngeal tuberculosis is a paleness of the mucous membrane; and it is something more than an anæmia, for while all parts of the larynx, naturally pink, will assume a muddy and greyish hue, the vocal cords will often be found congested, and many engorged capillary vessels will be seen ramifying on that portion of the mucous membrane considered anæmic. As the stage of tumefaction arrives, the colour, while it does not become less pale, is decidedly more opaque, except on the epiglottis, which, as it becomes thickened, may lose its natural buff hue, and assume a pale rosy tint (Figs. 71, 73, and 75, PLATE VIII., and Fig. 104, PLATE XII.). The mucous membrane of the larynx, and especially the epiglottis, is exceptionally heightened in colour in the case of acute tuberculosis, or as a result of an intercurrent catarrh.

Ulceration, except on the epiglottis and vocal cords, is not preceded by hyperæmia, but when the ulcers are formed there is often a faint red line at their circumference (Figs. 72, 73, and 75, PLATE VIII.). The surface of the vocal cords, where loss of tissue has taken place, is frequently of a greyish-white or pale yellow colour, while the rest of the cord is congested (Figs. 70, 75, etc.). The ulceration of the vocal cord is seldom deep; but it may extend to the arytenoid cartilage, and lead to caries and even extrusion.

Form and Texture.—Thickening caused by infiltration of the submucous tissue characterizes the second stage of laryngeal phthisis. The part first affected may be one or both vocal cords, which may be thickened along their whole length or irregularly; but much more commonly the first symptom is evidence of deposit in the inter-arytenoid space.

FIG. CXLI.

This sketch (Fig. CXLI.) indicates the general thickening in the inter-arytenoid space, and also of the ventricular bands. It was taken from a male patient, aged 29, under the care of my deceased colleague, Llewelyn Thomas. There was evidence of commencing disease in each apex, especially the right.

Then the well-known and often-described swelling of the arytenoid cartilages is seen, giving rise to the appearance of two pear-shaped bodies, the larger ends of which meet in the centre line, and consist of the swollen and no longer distinguishable cartilages of Wrisberg and of Santorini,

tapering off more or less in proportion to the swelling of the ary-epiglottic folds until they join the epiglottis (Figs. 71 and 74, PLATE VIII., and Figs. 106 and 107, PLATE XII.).

Equally unrecognisable is the condition of the last-named part, which becomes so misshapen that no longer is its free edge, superior or inferior surface, or any ligamentous fold, to be distinguished, the whole being swollen into a horse-shoe or turban-like shape, which lies nearly horizontally at the base of the tongue, or is so flexed on itself as to resemble a lateral view of the index-finger in a similar position (Fig. 74, PLATE VIII., and also Fig. CXI., p. 202).

Some allusion has been made to the character of the ulcerations: their peculiarity is their worm-eaten, carious appearance, showing that degeneration has not commenced at the surface, but in the deeper tissues, or rather, as is probably the case, that the secretion of the acinous glands has first undergone degeneration; the glands have swollen and have given way at the point most favourable for exit of the retained matter, namely, at the surface. These small ulcers then unite by breaking down the inter-acinous tissue, and so form large ulcerating surfaces (Figs. 73 and 75, PLATE VIII.). Narrowing of the glottis is often the result of tissue-changes, but there is rarely any attempt at cicatrization. Paralysis of one or both vocal cords is frequently seen, and may be due either to mechanical impediment or to nerve-pressure (Fig. 75, PLATE VIII.).

Mandl was one of the first to draw attention to the fact, illustrated in the figure referred to, that, contrary to experience in other paralyses of the recurrent laryngeal nerve, the right nerve is much more frequently pressed upon than the left in cases of laryngeal phthisis. This, as already noted, is explained by the anatomical relation of the right nerve to the apex of the lung.

Secretion.—As mentioned when treating of the sputa under the symptom of Cough, the secretion is altered in character from a glairy, viscid exudation of moderate amount to a copious muco-purulent discharge.

The accompanying sketch (Fig. CXLII.) not only illustrates the character of tuberculous ulceration, but the manner in which the mucus, when tenacious, forms bridges between the vocal cords. This condition is not peculiar to laryngeal phthisis, and is to be witnessed especially in that form of inflammation known as *laryngitis sicca* (p. 278).

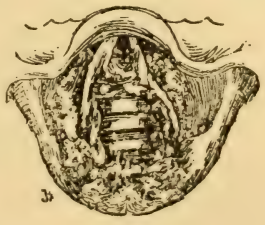

FIG. CXLII.

Whenever there is actual chondrial caries, the odour is very characteristic, though fœtor of the discharge may be also due to pulmonary causes.

If doubt exists as to the diagnosis, the secretion may be examined by the method proposed by Dr. Fenwick, of boiling with a solution of potash, to destroy the mucous elements, and submitting the deposit to microscopic investigation. In such a case elastic lung-tissue will often be seen at a period prior to the existence of well-marked auscultatory signs. This method of examination has, however, been almost entirely superseded in favour of the more certain results to be obtained by investigation for the tubercle bacillus.

C. Miscellaneous.—There can be no reason for entering largely into general symptoms, except to remark that increased frequency of the pulse and range of body-temperature, as well as evidence of mal-assimilation, giving rise to dyspepsia and loss of weight, are of as great importance in the early stages of laryngeal as of pulmonary or other form of phthisis. With reference to the state of the lungs, early and frequently-repeated auscultations should be made. At first there may be nothing more than slightly diminished resonance, hardly perceptible increase of vocal fremitus, and prolongation of expiratory murmur; but gradually and surely the chest-evidences will become more strongly marked. It must be remembered that though tubercular disease may be first detected in the larynx, until recently no case has been reported in which a patient has died of that disease without well-marked symptoms in life, and appearance after death, of pulmonic disintegration. In many cases of deeply situated pulmonary disease the negative evidences afforded by the stethoscope are apt to colour too favourably one's opinion of laryngeal symptoms.

Diagnosis.—In the assumption that there is a difficulty in differentiating tuberculosis in the larynx from syphilis, some writers have seriously, and, as we consider, needlessly exercised their minds on the subject. Having nothing to add to the opinion given by Dundas Grant and myself in the article so often previously quoted, our remarks under this heading are repeated here with but slight modification, and with the less hesitation because [17]Bosworth, [18]Beverley Robinson, and other careful observers have since that time specially drawn attention to them as accurately expressing the opinion of the majority of laryngologists:

'The symptoms as narrated in the foregoing descriptions are so typical, as to enable even those unaccustomed to the use of the laryngoscope to diagnose the condition with tolerable certainty. Briefly, the emaciation and loss of weight, night-sweats, aphonia, cough with profuse laryngorrhœa of semi-purulent character, pain only in deglutition, more marked in the case of fluids, with ten-

derness on pressure of the larynx, afford an unmistakable picture of the disease in question.

'In *cancer*, besides its more marked cachexia, the disease is distinguished by the constant presence of pain, independently of functional acts, as well as its occurrence in deglutition, being more intense in the case of solids than of fluids.

'The distinctions from *syphilis* have been succinctly and accurately considered by [19]Moure. Syphilis gives a hoarse, rather than an aphonic character to the voice; is, on the whole, free from pain, and has other symptoms of its own sufficiently distinctive to afford a reliable guide.

'Anchylosis of the crico-arytenoid articulation, paralysis of laryngeal muscles, as from pressure on the nerves supplying them, or following diphtheria and other diseases, are unaccompanied by general emaciation, unless in the case of nerve-pressure the paralysis be due to a malignant growth. Thus, in a general way, the symptoms, apart from the physical signs, give a fair clue to the presence of laryngeal phthisis.

'It is, however, only by a recognition of the characteristic appearances as reflected in the laryngoscope that a certain diagnosis can be made. These appearances are the peculiar semi-solid swelling and worm-eaten ulceration of the epiglottis and ary-epiglottic folds often described by other authors and well illustrated in the figures accompanying this work. The swelling is often much greater on one side than the other, but we never see tumefaction of the tissues covering one arytenoid cartilage much advanced without a similar condition existing to some extent over the other side also, thus distinguishing it from cancer and from non-tuberculous perichondritis. We have used the word semi-solid as applied to the swelling, but its resemblance under the light of the laryngoscopic lamp to serous or purulent effusions is often so complete as to mislead even practised observers.

'The ulceration of laryngeal phthisis has been, for what reason we know not, a stumbling-block to many laryngoscopists. Von [20]Ziemssen states: "Neither the catarrh nor the ulceration of phthisical subjects presents any characteristic signs by which it could be recognised as such." This assertion one of us ventured to combat on its first appearance. We, however, find Dr. [21]Vivian Poore telling his students at the London University College that "this is perfectly true, and that his experience enables him to endorse this assertion." [22]Cohen is of much the same opinion, and says "that the aspect of these ulcerations is hardly sufficiently characteristic for differential diagnosis, without reference to the

cachexia." Even [23] Morell-Mackenzie, whose earlier writings taught differently (see his essays in [24] Reynolds and [25] Aitken), although he describes very minutely and accurately the characteristic differences between the various specific ulcerations to which the larynx is subject, now gives in his adhesion to Heinze, and is of opinion that the latter "very properly declines to accept descriptions of the laryngoscopic appearances of tubercle (by Ter Maten, Türck and others), remarking that even in the case of a larynx fresh from the body, it is impossible to determine absolutely with the naked eye whether the ulceration is tubercular or not."

'Granted, with Mackenzie and Cohen, that in cases in which syphilis attacks phthisical patients, by no means so common now as before the recognition of pharyngeal tuberculosis, the diagnosis may occasionally be difficult, we cannot, in spite of the array of authorities which we have quoted against ourselves, admit the non-existence of a truly characteristic tuberculous ulceration in the larynx. On the contrary, we believe in it most firmly, and we venture to speak boldly on this question from a clinical standpoint, in opposition to the timorous who will not admit tubercle without distinct pulmonary evidence during life or microscopic examination after death. We can only further say that with the exception of laryngeal growths, we know no disease in which, with the laryngoscope, we can be so sure of our diagnosis, and that, so far from being dependent for confirmation on an examination of the chest, we have in not a few instances diagnosed the disease in the larynx in spite of opinions of eminent auscultators that the chest was sound. To more particularly formularize our views on this important point, we hold that, given the characteristic grey semi-solid infiltration of epiglottis, ary-epiglottic folds, or both—an appearance we consider almost invariably the precursor of ulceration—there is a form of ulcer superimposed on the swollen tissue, which we believe to be distinctly characteristic, and which we are able to foretell is incurable. In the absence, however, of the thickening, the character of the ulceration is hardly less typical. It is in itself essentially one of that class in which there is absence of healing, owing to defect of action. We do not desire to reiterate descriptions often already detailed, nor can we hope to rival or to add much, many as are the years that have passed since it was written, to the graphic truth of the word-picture drawn of tuberculous ulceration by Türck, but these one or two points we would emphasize. The floor of a *tuberculous* ulcer is pale and granular and slightly depressed, the margins are fairly well marked but not deeply excavated, the surrounding

parts pale and languid, and there is an appearance of a spreading process of erosion very comparable to that of the nibbling of a small rodent animal. This is due to the confluence of small ulcers produced by the slow incurable inflammation of the mucous and closed follicles of the mucous membrane, and also to the ejection of minute tubercles which have worked their way to the surface. Very different from this is the punched-out, areolated excavation which is seen in *tertiary syphilis*, and which may be considered suggestive of a bite rather than of the continued nibbling to which we have likened the tuberculous ulcer. Nor need we insist on the angry, hyperæmic, thickened walls of a *cancerous* ulceration, with its accompanying deformities and other signs, to still further point the laryngoscopic diagnosis.

'We only ask the merest tyro in laryngoscopy to study carefully the wood-cuts of Türck, or even of Cohen and of Mackenzie, to say nothing of our own illustrations—which are, moreover, typical, not exceptional—and having studied them, to decide for himself whether Ziemssen is justified in stating that "the attempts made to establish pathognomonic peculiarities cannot be said to have succeeded."

'So far have we indicated with detail the intrinsic characters of the ulcer *per se*, which point to a phthisical condition. As for simple *chronic laryngitis* with ulceration, the rarity of this affection is so great, apart from phthisis, that Heinze reports (setting aside cases of syphilis, cancer or diphtheria) but 6 per cent. of cases of laryngeal ulceration unaccompanied by tubercle, and these few are further referred to typhoid. The further examination of neighbouring parts enables us to make as safe a provisional diagnosis as surgery in general admits, and certainly much more so than is usually possible in the domain of internal medicine. Thus, the condition of the pharynx and palate, be it in the pallid-veined condition of some cases, or in the well-marked state of tubercular ulceration of others, gives an unmistakable clue to the nature of the malady. The absence of evidence of syphilitic disease in the pharynx and of the deposit of cancerous material in the neighbouring lymphatic glands, further aids by a process of exclusion to a complete diagnosis.

'The temperature and the condition of the other organs of the body afford collateral evidence to the importance of which we need only allude, but with regard to the temperature, we have not always found, except in quite early stages, the variations of such extent as is usual in ordinary cases of pulmonary phthisis. This is due, no doubt, to the inanition caused by the odynphagia

which, in its turn, contributes so much to the more rapidly fatal termination of these cases.'

Course, Prognosis, and Termination.—As stated on page 218, in connection with tuberculosis of the pharynx and fauces, the prognosis 'is seldom doubtful,' and we are not justified in giving other than an unfavourable prognosis either as to recovery of health or duration of life. Nevertheless, in one case at least—that of a youth about seventeen—I have seen entire arrest of undoubted disease in both larynx and lungs, with restoration to health, this happy event being brought about by sea voyages to Australia. In other cases the progress of the disease is sometimes very slow, and may become chronic. This condition arises when the infiltration and ulceration are confined to intra-laryngeal tissues, as the ventricular bands, vocal cords and laryngeal aspect of arytenoid cartilages. In such circumstances there is often but little body-wasting, and the principal discomfort may be that of vocal impairment. Doubtless in these cases the laryngitis is not always truly tubercular, but is of the nature of a recurrent catarrhal inflammation occurring in the subject of pulmonary or other form of phthisis. Where the infiltration is considerable, especially of the ary-epiglottic folds, there is superadded distress due to dyspnœa and laryngeal cough. On the other hand, whenever the epiglottis or the pharyngeal aspect of the larynx is involved, and when perichondrial changes present themselves, the course of the disease rapidly progresses to a fatal issue, and gravely influences the prognosis which the pulmonic symptoms might otherwise indicate. The cause of such a rapidly fatal termination may be explained by the circumstance that the odynphagia, by preventing the taking of sufficient nutriment, adds the effects of starvation to that of uncomplicated phthisis; for although cases are not uncommonly reported of patients affected with dysphagia from other causes preserving life for nearly the natural span on spoon-diet, in such as we are now considering the enfeebled system, unable to sustain itself on a comparatively full diet, is much less capable of counteracting by slops and sops the rapid wasting the disease produces. Whatever the nature and amount of the laryngeal evidences of tubercle, it repeatedly occurs that the specialist is not only able to give an earlier and more accurate diagnosis, but he may also be forced to give a far more grave forecast than would be afforded by auscultatory and general symptoms alone.

Prognosis as to duration of life is, that given the degree of pulmonary disease, the rapidity of termination is greater in proportion to the amount of difficulty in swallowing.

The mode of death from local causes in laryngeal phthisis may be: (1) by suffocation; (2) by inanition and general marasmus; and (3) by hæmorrhage. The first may be possibly relieved temporarily by tracheotomy, the second by artificial feeding per rectum or by an œsophageal tube. The last is a rare event as occurring from a point within the larynx.

TREATMENT.—It is not necessary to repeat here the many details of general and local therapeutics, dietetics or hygiene which have been so fully discussed in our previous chapter on pharyngeal tuberculosis, at page 205.

The indications for **general** treatment in regard to the local trouble are to diminish the cough, so as to give as complete functional rest as possible, and also to endeavour by internal remedies to relieve the irritability of the upper portion of the gullet. For this latter purpose bismuth and bromide of potassium, taken shortly before food, will often be found of great service.

The hypophosphites of soda and lime in doses of five grains of each salt have certainly acted well in my practice, in those cases in which the evidence of the disease was primarily in the larynx, by checking night perspirations, diminishing cough, aiding digestion, and arresting loss of tissue.

I have no personal experience of the most recent treatment of phthisis—that of rectal enemata of sulphuretted hydrogen, either alone or combined with carbonic acid. Another new treatment, which is more properly local, and is also founded on belief in the parasitic nature of phthisis, is that of administration of germicides by atomized inhalations. Of these may be named those of atomized aniline, as recommended by [26]Kremianski, of Moscow; and of corrosive sublimate of the strength of 1 in 5,000, lately mentioned by [27]Reynolds. Regarding this last remedy, it should be remembered that germs are not the only things capable of destruction, and that they are killed with more difficulty than are normal cells, especially in persons of tuberculous tendencies.

Local.—In respect to local treatment, it is gratifying to know that many authorities eminent in the general treatment of phthisis—Dr. C. J. B. Williams, for example—have spoken in high terms of the relief that may be given by local measures when the disease attacks the larynx; and yet many general physicians do not quite fully acknowledge how much success depends on careful attention to detail.

A proper inhaler, generating steam at a temperature accurately registered according to the special circumstances of the patient and the time of the year, so that while moist, warm air is inhaled,

and the volatile ingredient thrown off, the respiratory muscles are not fatigued nor the circulation quickened, is surely better than a jug of hot water with a napkin lying over the patient's face and covering the jug as advised by the eminent author just named; and it is not surprising if in the latter instance there is a strong liability to induce perspiration. Again, when local remedies are applied they are often worse than useless, unless the mirror guide the hand, and the application be made to the part affected, and to that only.

Of inhalations—in the anæmic stage, and when the thickening is only commencing, stimulating volatile ingredients, as creasote, the oil of pine, and some essential oils, in water at a temperature of 130° to 150° F., are of service; but when cough, distress of breathing, and dysphagia, due to narrowing of the larynx, ulceration of the cords, or of the epiglottis, occur, all inhalations must be of the most soothing nature.

Plain steam of water, at from 120° to 140° F.; compound tincture of benzoin, one fluid drachm to a pint of water, with or without three to five drops of chloroform, for each inhalation; pine oil, eucalyptus, conium, or hop—are to be recommended (Form. 29, 30, 31, 34, 36, and 37).

With respect to the last-named remedy, it should be remembered that the oil of hop is very stimulating, not to say irritating; while the extract, with a little carbonate of soda, as used with the extract of conium, or a fresh infusion, is most soothing.

Spray inhalations, as employed by the patient for several minutes at a time, are of but little use in laryngeal phthisis; they, as a rule, involve great fatigue, and are peculiarly irritating to the mucous membrane, which in this disease is unusually sensitive. The use of iodine in the form of inhalation is also to be deprecated, on account of its powerfully irritant properties.

Scarification is of most doubtful propriety in this disease: the wounds would invariably ulcerate, and the operation would certainly, looking at the very solid nature of the thickening, give but a minimum of relief.

Still greater local benefit may be found in the use of the brush than by inhaling; and here again it is encouraging to find Dr. Williams agreeing in condemnation of nitrate of silver. The solutions appropriate to the pharyngeal ulcerations, as enumerated on page 218, are of equal utility in the laryngeal disease. Cocaine lozenges are successful in relieving the pain of swallowing, but their effect is often disappointing.

Lozenges containing morphia or opium are of the greatest value in relieving the cough, but it must be remembered, *in*

regard to them, how small an amount of opium or of morphia, taken in a lozenge or solution, if frequently repeated, will have the desired effect (Form. 16 and 19).

All food should be of the blandest character, and should be taken at a most moderate temperature. It will often be prevented from 'going the wrong way' if the patient be directed to thicken his drink, and to gulp instead of sipping it. The raw egg swallowed *en bloc*, as previously described (p. 149), will be found both agreeable and nutritious in this disease. [28]Wolfenden has published the following simple method, learned from a patient, of obviating difficulty in swallowing, experienced in those cases in which the epiglottis is thickened and ulcerated. The patient, lying on a couch stomach down, and with the legs elevated, sucks, by means of an india-rubber tube, fluid from a tumbler held in his hand. The advantage of this method has been repeatedly confirmed by myself and many other practitioners.

The foregoing represents, with but slight modification, the lines of treatment I advocated in my former edition. The question once more occurs, can we do more than relieve the symptoms—can we arrest or cure a laryngeal tuberculosis?

With rare exceptions the combined general experience of specialists has hitherto been to the effect that although a tuberculous ulceration in the throat may heal, as in other parts, such a process is certain to be followed sooner or later by an outbreak in close proximity. The disease, as we have seen, may even become chronic and lie dormant, of which state Solis Cohen reports several cases, with praiseworthy further narration of the final result. Writing six years ago, we ventured to say that 'not even the most sanguine throat specialist is yet justified in giving even a moderately hopeful opinion as to the result' of any known treatment.' That expression was received with general favour, and has more than once been quoted. The question is, are we able to modify that opinion in the present day?

We dismiss from consideration treatment by iodide of potassium —stated by [29]Moritz Schmidt at Milan, in 1880, to be efficacious in curing tuberculous ulceration in the larynx—since we have found it universally baneful rather than beneficial in our personal practice, in undoubted cases of laryngeal phthisis uncomplicated by syphilis. Nor, from our experience of even slight scarifications, can we subscribe to the practice of deep incisions into the infiltrated tissues, as advocated by the same authority, and by [30]Rossbach.

Our brief notice at page 220 of the more recent methods of

Krause and Rosenberg, were written before we had been able to give them anything like effective trial; nor are we yet in a position to speak more than encouragingly concerning them. In a paper read by [31]Krause before the Laryngological Subsection of the fifty-ninth meeting of German Naturalists and Physicians at Berlin, on September 21, 1886, that author asserted that 'ulcers of the posterior laryngeal wall are curable by lactic acid. If there is not too much marasmus, which is a contra-indication, no tuberculous ulcer can resist cicatrization by application of lactic acid, made by a practised hand. The pain or even a certain amount of spasm resulting from the treatment is no contra-indication.' The success of this measure was confirmed by such eminent authorities as Schroetter and B. Fraenkel. Schnitzler, at this meeting, while admitting that laryngeal phthisis is curable, remarked that every new medicament has had its temporary successes, and he believes iodoform to be better than lactic acid. The results of our own practice are directly opposed to this; for with considerable experience, we have seen no benefit whatever from either insufflations of iodoform in powder or applications of it in solution.

[32]Hering, of Warsaw, a trustworthy and also an original and bold practitioner, read two papers on the same occasion, 'On the Curability of Tuberculous Laryngeal Ulcers, and on their Treatment,' and reported that 'he had seen eight unquestionable cases which prove the curability of tuberculous ulcers. He had also seen cures of such ulcers without medication. The ulcers were on the true and false ligaments, *pars arytenoidei*, and epiglottis. Their tubercular nature was certain from the contemporaneous affection of the lung, and the presence of bacilli. In three cases, the cure lasted respectively nine, two, and one years; and in five cases half to three years. The larynx cured, the lung is ameliorated, the voice becomes better, and general improvement results.'

Early in 1887 I exhibited a patient at the Medical Society treated by the method of Krause, the details of whose treatment in every respect are in accordance with his statements.

It is that of Matilda H., whose history, symptoms, and physical evidences in throat and chest are narrated at pp. 213 and 214, and I append copies of the appearance sketched on her case-paper (Figs. CXLIII. and CXLIV.).

It will be observed that the manifestations were in this case in the very situation remarked by Krause as favourable to treatment. Having applied cocaine, I first scraped the parts with a circular curette—in fact, the instrument of Löwenberg for removal of post-pharyngeal adenomata. I then applied on a cotton-wool brush, and with considerable firmness, a 20 per cent. solution of lactic acid. This was repeated daily, the strength being increased to 40 per cent. and 60 per cent. At the end of three weeks acute inflammation of the pharynx and larynx took place; but, as asserted by Krause, the plan was no contra-indication to success, for on recovery the parts cicatrized healthily, and not only

was the extreme odynphagia which had been experienced on admission completely relieved, but weight was regained, and the pulmonary condition improved. It only

FIG. CXLIII.—PHARYNGEAL APPEARANCE.

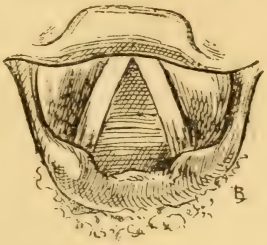

FIG. CXLIV.—LARYNGOSCOPIC IMAGE.

remains to add that the patient is still alive and in fair health, Feb. 1890.

All my colleagues are equally enthusiastic with me in experiments with this method of Krause, and we have kept careful record of each case treated. We have not found the lactic acid beneficial in purely laryngeal cases, and believe that the 20 per cent. solution of menthol in olive-oil, as recommended by [33] Rosenberg, is decidedly of greater value in those conditions. Menthol is also most useful as an oro-nasal inhalant and stimulant in the anæmic, and as a sedative in the later stages. Since the publication of the former edition we have had several cases as strikingly relieved as the one quoted; and we have seen many in which, after a few days of treatment, emaciation has been arrested, deglutition improved, cough and amount of local secretion diminished, and, lastly, an actual regain of lost weight. It is also right to add that in every case we urge employment, for at least twelve hours a day, of the oro-nasal inhaler with the inhalants in Form. 41, 52, and 53, or with menthol, and to this measure we attach great importance.

I am not of opinion that the exact mode in which the application is made to the larynx influences the result; but Bosworth, who for many years has claimed a large proportion of cures, or at least of arrest of the tuberculous process in the larynx, lays great stress on the use of the spray, locally directed by the physicians with the aid of the mirror. Personally, I have doubts if by this method the application reaches to ventricles, etc., so completely as by a soft brush made of absorbent wool, and only moderately charged with the solution. This view has been enforced by [34] Roe; but it appears to me that there is also an additional objection to the direct treatment of laryngeal diseases by means of sprays and syringes, in that solutions of considerable strength make their entrance into the subglottic region with greater force and in larger quantity than is the case when a brush is applied. As a

result, there is considerable danger of destroying the cilia of the trachea and bronchi, and of increasing the tendency to catarrhal inflammations of those canals. In the use of lactic acid there cannot be a doubt that some amount of distinct friction is necessary, but the application should always be localized to the exact part implicated. Before the solution is employed the ulcer should always be carefully but thoroughly scraped by a curette.

Tracheotomy.—In my former edition I spoke very unfavourably of the operation on patients who are the subjects of laryngeal phthisis, and I am not now prepared to admit that it is advisable, except in rare instances, and to relieve extreme symptoms of a suffocative character; for it should be borne in mind that in this disease the whole mucous membrane is most sensitive to irritation, and is strongly disposed to ulceration, and that the cartilages of the larynx and trachea are, if not actually degenerated, most prone, with the least aggravation, to caries. It is therefore extremely doubtful whether presence of a tracheotomy-tube does not, in such a case, actually increase the embarrassment of both respiration and deglutition. At the most, it can but prolong life a few days or weeks, with but little, if any, amelioration of distressing symptoms, while in one direction, as pointed out by [35] Percy Kidd, the distress of cough is distinctly increased, the presence of the tracheotomy-tube making the act of coughing much more difficult, and even impossible.

Early tracheotomy has been advised in this disease on the twofold plea (1) that the disease may be primary, and that by tracheotomy the lungs will be less liable to be infected; and (2) that functional rest is hereby afforded to the larynx, and a better chance given of success by topical medication. Curiously enough, it has to be added that one of the strongest advocates of tracheotomy in laryngeal phthisis, [36] Beverley Robinson, of New York, has also maintained that a laryngitis occurring in the course of a pulmonary phthisis is not necessarily, nor indeed frequently, of itself tuberculous, but is to all intents and purposes of the essence of an ordinary catarrh. Answering the first of these pleas, the probability of the tuberculous disease being primary in the larynx, I have to say that though I for many years believed in the possibility of a primary tuberculosis of the larynx, before it was actually demonstrated as a fact, I cannot agree that such a circumstance is other than rare in medical experience. And as to the second, I am not at all prepared to admit that absolute rest of the larynx is likely to follow a tracheotomy on a tuberculous patient, whatever the stage; on the contrary, in no disease is a tube so ill-borne or so liable to set up increased inflammatory irritation and ulceration. Moreover, in no disease is more likely to occur the

untoward risk of what we may call collapse of the larynx—a not unfrequent result of tracheotomy—which was first pointed out by Liston, and has since been insisted on by Whistler. Nor can I agree that the larynx can be more effectively treated by topical measures after tracheotomy than before, for, on account of the disposition to collapse just mentioned, the larynx is almost invariably far more difficult to examine, as also to be treated internally, after a tracheotomy-tube has been introduced.

Tracheotomy is advocated by [37] Moritz Schmidt on the ground that it not only betters respiration—to the lungs I presume—but also that it deviates from the larynx the passage of irritating air—to which it has only to be replied that by use of oro-nasal inhalers and suitable atmospheres, the air to the larynx can readily be made non-irritating, and even beneficial, and this to a greater extent than can be provided for in the air which goes to the lungs through a tracheotomy-tube.

But the operation is also performed by Schmidt, by Heryng, and by Gouguenheim and Tissier, not only where the laryngeal disease is marked and advancing, but in cases in which the lungs are admittedly affected. The last-named joint authors, in their recently-published classical treatise, hold that even extensive disease of the lungs does not contra-indicate the operation, if the temperature be not high, and digestion be good—to which condition I cannot assent, for a comparatively low temperature in laryngeal phthisis is by no means a favourable indication, while a good digestion is a circumstance hardly ever likely to be afforded us as a factor for consideration in this disease, and certainly not in advanced cases.

I must, therefore, with all respect to the many able laryngologists who advocate tracheotomy in tuberculous laryngitis, offer my uncompromising opposition thereto, hardly excepting cases of urgent dyspnœa, in which it is considered as permissible by Solis-Cohen, Morell Mackenzie, and Krishaber. I certainly would not perform it, except at the request of the patient or his friends, and not even then without very plainly stating that, although death by actual suffocation might be thereby averted, life would hardly be prolonged, and that only at some considerable expense of suffering and lingering distress. I think also that we ought to bear in mind that performance of tracheotomy in a case of advanced tuberculous disease is likely to bring both the operation and the surgeon who performs it into disrepute; for, as to the operation, an unfavourable result in one case may militate against consent being given to its performance in another, where chances of permanent relief might be good; and as to the operator, especially if he be a specialist, there will not unlikely be found a

medical brother (save the mark!) who will speak of tracheotomy having been performed by one who would not or could not look beyond the narrow area of his special province.

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CHAPTER XX.

LUPUS AND LEPROSY OF THE MOUTH, PHARYNX, AND LARYNX.

(Fig. 119, PLATE XIV.)

[It has been thought convenient to treat all these conditions under one heading, but in view of the greater importance of the laryngeal manifestations, discussion of those in the other regions of the throat has been postponed from the position they should occupy according to the plan of this volume.]

AT the time of writing my first edition I had not seen a case of lupus in the throat, and at the date of its publication there were only nine cases on record, of which at least three were doubtful. Just, however, at that period [1]Lefferts contributed an important essay on this, as it was then considered, rare disease, with a carefully recorded case which had occurred in his own practice. He it was who first suggested that lupus of the throat would be found to be much less rare than had hitherto been supposed, if it were looked for in all subjects presenting cutaneous manifestations. Until then only patients who complained of laryngeal symptoms were inspected with the laryngoscope in the Skin Clinic of Vienna, and of the whole number thus examined the proportion that afforded evidence of lupus in the larynx was only 8 per cent.; but systematic laryngoscopic observation of every patient with lupus by [2]Chiari and Riehl showed that the larynx was affected in as many as six cases out of sixty—10 per cent. [3]Holm, of Copenhagen, found disease in the larynx in six cases out of ninety with the general disease. These combined investigations give a proportion of about 8 per cent. of laryngeal manifestations in 150 patients suffering from lupus of other parts of the body; and the figures agree closely with my own experience.

Through the kindness of Drs. Harries and Campbell I had an opportunity, in the summer of 1886, of examining the throats of twenty-five patients suffering from lupus, who were at that time attending St. John's Hospital for Diseases of the Skin. I found laryngeal changes in three cases; in one of these there was also ulceration

of the velum. But I discovered palatal evidences in three others; so that one-fifth of the cases, or 20 per cent., were the subject of either faucial or laryngeal manifestations, while the latter only were present in 12 per cent.; the same proportion as was observed by Chiari and Riehl. Strange to say, though the voice was more or less hoarse, thick, or nasal in every one, in not a single instance was there complaint of difficulty in either deglutition or respiration. This circumstance illustrates an important diagnostic element of the disease, namely, that the functional symptoms are as a rule very slight even in the presence of long-standing manifestations. In addition to the foregoing cases, to all of which more detailed allusion will be presently made and their throat appearances portrayed, I have seen three other cases with laryngeal manifestations, and one with solely palatal changes; I have also had the opportunity of studying a fifth under the care of my colleague, Dr. Orwin. Thus, in twenty years of special throat practice, I have seen fewer laryngeal, and still fewer palatal, cases of lupus, than I saw at a Skin hospital in a few weeks.

[4] Lefferts goes so far as to affirm that 'he would not accept the diagnosis of lupus of the larynx or pharynx, unless accompanied by lupus of the face.' Without doubt such an association is the rule, but quite a number of cases have been recorded in which the laryngeal disease has preceded the cutaneous. Some of them are admittedly equivocal, notably the well-known one of [5] Von Ziemssen.

[6] Morris Asch, of New York, in an able essay on the disease, full of interesting bibliographical history, has reported

the case of a young girl, aged 18, suffering from ulceration, which he believed to be true lupus, occurring simultaneously in the larynx and pharynx; but there was already on the posterior wall of the pharynx a large radiated cicatrix, of the origin of which the patient could give no history. . . . Examination of the surface of the body discovered no cutaneous lesion, eruption, or enlarged glands, and the closest inquiry failed to reveal any antecedent syphilitic history, inherited or otherwise. The patient was a tall slender blonde, of the type with which we are accustomed to associate strumous disease.

The condition of the teeth is not noted.

Lefferts, in discussion, expressed his opinion that this case was one of inherited syphilis, and undoubtedly, in the absence of cutaneous corroboration, the diagnosis is not easy; but the following case is in every respect very similar, with the exception that confirmation of this character did not occur *till six years after the throat affection.*

The case is inserted by the kind permission of Dr. Orwin, whose patient she is.

CASE I.—Maggie N., a fair girl, aged 21, from Northampton, first attended at the Central Throat and Ear Hospital on September 11th, 1886. She gave the following history: when 11 years old had bronchitis with ulcerated throat. She was ill for six months. Since that period she has had fairly good health, but has always been conscious of a slight wheezing sound in her breathing. She did not apply on account of her throat, as 'she reckoned that well,' but for the disease of her nose (Fig. CXLV.), which presented all the characters of, and was at once diagnosed as, *lupus vulgaris*.

FIG. CXLV.—LUPUS OF THE NOSE AND UPPER GUMS.

By reference to the illustration, it will be noticed that the disease had also attacked the coverings of the alveolar processes of the upper jaw. The gums were almost eaten away, and as a consequence the upper teeth had an abnormally long and projecting appearance; otherwise they were well formed and free of any characteristics of syphilis or scrofula. The gums had been first affected *more than four years previously*, and the erosion was stated to have been very gradual. The disease of the nostril *commenced some months later*, and the patches on the cheek still more recently. The family history was good, and the general health and nutrition of the patient were excellent.

The **voice** of this patient is but slightly modified in phonetic quality; articulation is nearly perfect, perhaps a little altered by the condition of the teeth and gums, and sometimes it is a trifle nasal in character. The **respiration** is slightly wheezing; the sound being laryngeal during inspiration, and nasal during expiration. There has never been any dyspnœa or increase of stridor, and she

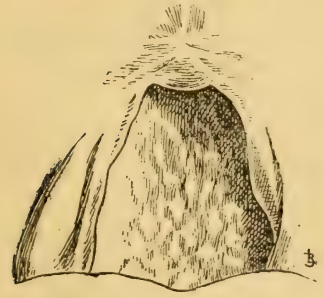

FIG. CXLVI.—CONDITION OF THE PHARYNX.

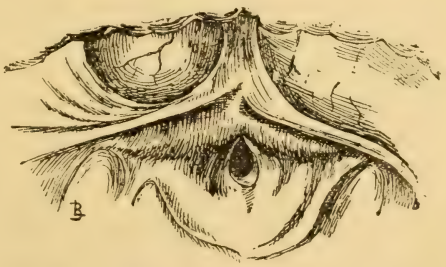

FIG. CXLVII.—CONDITION OF THE LARYNX.

can run up and down stairs without distress. There is no **cough**; **deglutition** is quite normal, and there is no disorder in the senses of **hearing**, of **smell**, or of **taste**.

On examination of the pharynx (Fig. CXLVI.) it is seen that the whole of the uvula and a portion of soft palate and of the pillars of the fauces have been destroyed, and

there is a stellate scar above the situation of the uvula. The hard palate had been untouched by disease. The posterior wall of the pharynx is somewhat more granular than normal, and certainly more so than in tertiary syphilis.

The laryngoscope showed a very peculiar condition (Fig. CXLVII., and Fig. 119, PLATE XIV.). The whole mucous membrane is markedly pale, and of an opaque warm greyish tone. There is no sign of any active inflammation, and on touching the surface sensibility is found to be diminished. The epiglottis is almost entirely destroyed, and is represented by several tight cicatricial bands which are, as it were, hypertrophied substitutes for the ordinary epiglottic ligamentous attachments to the tongue and pharynx. The under surface or cushion is continuous in plane with the ventricular bands, which in turn are merged into the ary-epiglottic folds.

In the centre is observed a small opening that will not admit an instrument of the size of a goose-quill. This orifice is evidently on a level superior to the vocal cords which, from the tone of the voice, appeared to be quite unaffected. There is no hypertrophy of the papillæ of the base of the tongue.

The patient was exhibited by Dr. Orwin at the Medical Society of London in November, 1886, when she was seen by many specialists, who agreed in the diagnosis of lupus; but had it not been for the cutaneous evidence which was only afforded six years after the ulceration in the throat, there can be no doubt that this case would have been set down as one of syphilis, or at least as one of *scrofulous lupus*, described by [7]Homolle, and acknowledged as a separate variety by Lefferts. I see, however, no useful object to be gained by adoption of such a subdivision.

[8]Knight, of Boston, has recorded three cases:

His first has many points of striking similarity to the foregoing, but the throat was affected subsequently to the face.

In his second, the patient—a married female, 36 years old—had scarlatina at 8 years of age, serious throat trouble of the nature of lupus at 25, and ulceration of the skin of the nose at 28, 'after ulceration of the throat.' In speaking of this case in discussion, the author had no doubt that it 'was a genuine one of lupus, and the lesions upon the skin confirmed this view; certainly the manifestations appeared too late to be considered as due to congenital syphilis, and acquired disease was out of the question.'

The only element of doubt is that there was necrosis of the hard palate—a circumstance incompatible with the generally admitted fact that the ulceration of lupus may extend to muscles, tendon, and cartilage, but that it stops short at bone. Knight's third case is one which he believes to have been lupus of the pharynx, without manifestation elsewhere.

Consideration of all the foregoing cases, as well as of others of a similar character, reported by competent observers, and especially of that of Dr. Orwin, must force us to the conclusion that lupus may exist in the throat without external manifestations, or long prior to the same; and that, though such a circumstance is undoubtedly exceptional, it is just one of those exceptions to a rule which, as Sir James Paget has recently said so wisely, may be in fact but the beginning of a new law.

Etiology.—Lupus has been generally considered by English and French dermatologists as evidence of a scrofulous taint—a term which is, for the most part, very loosely applied. Without doubt it often represents a euphonious synonym for syphilis, and is indeed so employed by [9]Erasmus Wilson in connection with this very disease. Others—[10]Pye Smith, for example—think that 'the whole process is strikingly similar to that which occurs in the lungs during the course of phthisis.'

I think everyone will admit that the general characters of lupus are more nearly allied to those of tubercle than of syphilis; but the sthenic character of the constitutional state is as strikingly different from the first, as is the fact that anti-syphilitic (mercurial) treatment in true lupus does but aggravate the malady, a distinctive feature of the second. German authorities, while repelling the scrofulous theory, offer nothing better as an etiological substitute. [11]Gottstein expresses the general opinion that 'the causes of laryngeal lupus are similar to those influencing the disease in other parts, or, in other words, often unknown.'

[12]Harries and Campbell, in a recently published joint contribution of high clinical value, thus summarize:

'In order that this disease may develop there will be needed—

'(*a*) *Suitable Soil*, whose exact characters we are as yet unable to define; which, though possibly allied to tuberculosis and scrofula, is yet not identical with either.

'(*b*) *A Predisposing Cause*.—Traumatism, at some period perhaps remote, being the most important.

'(*c*) *An Exciting Cause*.—Probably a micro-organism.'

As to the first of these factors there is nothing more to be said; as to traumatism, Virchow has defined scrofula as 'vulnerability,' by which he means a tendency to react on slight injuries, and difficulty in recovering from them; and undoubtedly this influence is very frequent in lupus. In one, that of J. V. (No. 8), to be presently described, injuries were the cause not only of the first manifestation on the face, but of several later ulcerations in remote portions of the body. What is the immediate cause of lupus in the throat it is difficult to say. In one of Knight's cases scarlatina is suggested. In others it may be due to auto-inoculability, which is an undoubted feature of lupus. Whether in these cases there is a slight scratch or abrasion on the gums or soft palate in the first instance, or whether it be due to the transplantation on a wounded or unwounded surface of a micro-organism, I do not presume to decide; but with regard to the presence of germs as an

exciting cause, it is by no means clearly proved that they are more than secondary concomitants. [13]Campbell, in the 'Essays' referred to, has discussed this question at great length and with impartiality. While admitting that they are possibly pathogenic, he is forced to admit that 'so far as we can gather from the works quoted, lupus bacilli have only been observed in cases where ulceration, actual or incipient, existed. Nevertheless,' he continues, 'we may be justified in stating that lupus, whether ulcerating or not, is probably coincident with the presence of bacilli in the diseased tissue.' It may just be stated further that while some investigators—[14]Koch, for example, and also [15]Neisser—contend that the bacillus of lupus is identical with that of tuberculosis; others, including [16]Kaposi, [17]Schwimmer, and Campbell, affirm that there is no such similarity or identity.

Lupus of the throat, as in the skin, is more common in females than in men, and, as a rule, is more often seen in the lower than the upper classes of society.

An exception to this rule was seen in the first instance of lupus in the larynx which occurred in my own practice. The case (No. 2) was that of a lady, aged about 48, who was sent to me in November, 1879, by Dr. Poyet, of Paris, on account of lupus in the larynx, which was manifested in the form of considerable hyperæmia and nodulation of the epiglottis, and ulceration of the right ary-epiglottic fold. She was the subject of four or five patches on various parts of the body, one on the neck just under the right angle of the jaw, for which she was concurrently treated by Mr. Jonathan Hutchinson. The disease had existed for about three years, and no cause could be ascertained for its origin. The patient was considered to be of a gouty-rheumatic diathesis, and had twice undergone a 'cure' at Aix-les-Bains for sciatica. She was above average height, well nourished, and the mother of two healthy and exceptionally handsome daughters. The husband was also tall and strong, and was most positive in his denial of any venereal history.

It is worthy of remark that while under treatment this lady fell downstairs and cut her face. The wound, which required sutures, healed well and quickly.

The disease is said to be most commonly manifested in youth. The ages of the eleven patients seen by me have been 21, 48, 43, 46, 20, 17, 8, 24, 23, 16, and 19. In twenty-three cases observed by Homolle, eighteen occurred before the age of 20. His observations are in accordance with those of Hebra regarding the general malady, but are contravened by [18]Ramon de la Sota in connection with the region now under consideration; he distinctly says that he has seen lupus in the throat in adults oftener than in children, and oftener in men than in women. This author does not believe that 'any local agencies whatever are to be considered as especially prone to produce the disease.'

Finally, it may be mentioned that, with one exception (No. 11),

all the cases I have seen in the throat have occurred to persons of fair complexion, with light or light-brown hair, and with blue or grey eyes; in fact, in those recognised as of lymphatic temperament.

PATHOLOGY.—This has been discussed to some extent in my remarks on Etiology, and there is nothing specially distinctive in the characters, either macro- or microscopical, of the disease in the throat. The surface appearances will be best given under the head of objective or physical signs, and I need only express my agreement with Lefferts that the first essential pathological element is hypertrophy of tissue—a hyperplasia and infiltration that changes to a marked degree the normal configuration of the part. The second element is the ulceration, which is always slow, is very destructive, but much more gradual and less actively inflammatory than syphilis when it attacks the soft palate, while in the larynx it partakes of the worm-eaten character of phthisis, indicating that it commences in the glandular and inter-glandular tissues. The resulting cicatrization is exceedingly hard and unyielding; it is accompanied by hyperplasia that tends to form contracting bands and to constrictions rather than to the formation of outgrowths. A pathological feature of distinction is the occasional occurrence of fresh granulations on cicatrized tissue. In the mouth it is evidenced by much granulation on the gums.

Chiari and Riehl describe laryngeal lupus as beginning with development of single papillary growths, varying in prominence and size (from a millet to a hemp-seed), as is the case in other mucous membranes; these either remain single or appear in crowded groups on the slightly hyperæmic mucous membrane. The groups increase either in the neighbourhood of or on the parts first affected, both in extent and prominence, so that at one time is seen a flat, not very prominent, and glandular-looking thickening of the mucosa, while in other cases there are produced nodular and prominent swellings.

I cannot agree with Gottstein that the infiltration is often absorbed. The reduction in swelling which takes place may produce apparent absorption, but it is at the cost of indurating and stenosing cicatricial contractions.

With the exception of the epiglottis, which is the part most frequently attacked, the cartilages of the larynx seldom undergo inflammation or degeneration. Gottstein, however, mentions that exfoliation of the arytenoid cartilage was once observed by Eppinger, and partial destruction of the thyroid cartilage by Idelson.

It is of great interest to endeavour to trace what is the connection between lupus and tubercle. As has been already remarked, there are an equal number of eminent observers arrayed both for and against the view that the bacillus of the two diseases is identical; and clinical evidence would appear to show that there is a

decided similarity between the two affections. Neisser is of opinion that 'Qualitatively (probably) the bacilli are the same, only quantitatively there is a difference, which is intensified by the less favourable nutritive conditions in the cooler skin.' But there are many reasons for supposing that the distinction between the two is not one simply of quantity; for lupus is very little, if at all, more rapid in its progress when it attacks the mucous membrane than when it is manifested in the 'cooler' skin; and, moreover, from the vital point of view, tuberculosis is much more universally and rapidly fatal to life than lupus. The probable truth, then, is that, though perhaps not morphologically distinguishable from that of tubercle, the microbe of lupus is the less powerfully infective both locally and constitutionally, or, as [19]Marty tersely has it, lupus is an 'attenuated tuberculosis.'

SYMPTOMS: A. FUNCTIONAL.—Without entering at length into each symptom, generally it may be said at once that whether in the mouth, pharynx, or larynx, the symptoms are slight, out of all proportion to physical signs; a fact in which most observers with practical experience are agreed. In the only case narrated by Gottstein, 'the patient had neither pain nor discomfort in the throat, and was much astonished on being told that her throat was affected by the same disease as her ear' (the primary seat of the lupus). A similarly entire unconsciousness of serious laryngeal mischief was exhibited by Orwin's patient. In three cases mentioned by Homolle, two had no knowledge of any trouble antecedent to cicatrization. In the cases of Asch and Lefferts, however, there was considerable dysphagia, and distressing cough with hoarseness and a sense of obstruction or tumefaction in the throat.

B. PHYSICAL.—I have seen only one case in which lupous ulceration was exhibited in the mouth, apart from those alluded to where the gums were attached.

CASE 3.—W. B., aged 43, a waiter, presented himself at the Throat and Ear Hospital in April, 1881, on account of ulceration at the angle of the right lip, which was of true lupous character, and extended inside the cheek. On the right arch of the palate and involving the uvula was a group of highly inflamed molluscus-like nodules (Fig. CXLVIII.). The larynx was healthy. There was a large cicatrix on the right side of the neck, of which he could give no history, except that there had been a sore there, which healed before he was eight years old. He complained of no symptom but the disfigurement of his lip.

FIG. CXLVIII.—LUPUS OF THE SOFT PALATE.

In the palate I have seen several cases. As the early manifestations of lupus in this region have not, I believe, been described, I shall give my impressions at length. In only one has the deposit been of such a nodulated character as in the one just described. In all the portion of mucous membrane implicated is somewhat congested, the hyperæmia being more limited than in ordinary pharyngitis; where there is ulceration, the areola is much less vivid than in syphilis, but distinctly more so than in tuberculosis, and with an absence of the general anæmia of the surface, characteristic of the last-named lesion. The ulceration is neither so generally granular nor so superficial as in phthisis. It is distinctly more torpid than in either this disease or syphilis. Ulceration of the velum does not appear to proceed from the nasal surface of the palate, as is the rule in tertiary syphilis, but from the buccal; and though in one case I could pass a probe an eighth of an inch or more, there was no perforation. When destruction of tissue takes place it is not as a defined hole, but as a widening gap. I have seen but one case with inflammatory nodulation and acute ulcerating ravages to anything like the extent described by other observers, and that was in a child exhibited at the Medical Society by Dr. Colcott Fox, in November, 1886. This patient's throat very much resembled that depicted in Fig. 113, PLATE XIII., only that it was more actively inflamed.

The appearance of the uvula is peculiar. It is not inflamed and œdematous as in syphilis, nor anæmic and shrunken as in tuberculosis, but it is often swollen as with solid infiltration, so as to give a club-shaped appearance; it is generally distinctly congested, and frequently nodulated.

The first case in which I noticed this appearance occurred in my hospital practice seven years ago, and is herewith related from the notes of Dr. Dundas Grant, who was then Registrar:

CASE 4.—Ann D., aged 46, married six years, applied as an out-patient—not on account of her throat, but for otalgia on the right side—at the Central Throat and Ear Hospital, on the 15th of April, 1880. Observing a large (healed) lupoid cicatrix on the upper lip, it was ascertained that she had been the subject of tubercular lupus (non-exedens) of the nose, and then of the cheeks, since childhood. The health had always been excellent till the attack of ear-ache, which had commenced a fortnight back. She had had one child, who had died of bronchitis at six months. A doctor had noticed that her throat was affected sixteen years previously, but it had really never troubled her. There was absolutely no symptom of *voice, articulation*, or *deglutition* of an abnormal character, but she stated that her *breath* had always been rather short on exertion or during conversation. On examination of her throat it was observed that at the tip of the *uvula* was a sessile 'tuberculated' growth of red colour, and on the soft palate two raised red patches, and

several more or less visible spots much resembling the characteristic 'apple-jelly' appearance of lupus on the skin. The left posterior pillar was adherent to the pharynx, to which it was bound down by a dense, white, stellate cicatrix. The larynx was normal, except the epiglottis, the right half of which was much swollen and irregular, with small

FIG. CXLIX.—PALATAL APPEARANCE.

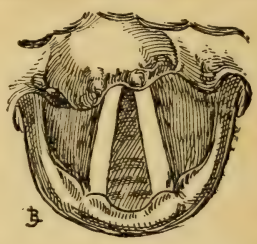

FIG. CL.—LARYNGOSCOPIC APPEARANCE.

nodular elevations over the swollen part; the left half was slightly thicker than normal, and had one or two nodules on its superior surface.

It may be added that the otalgia was found to be unconnected with the lupus, and was of a simple character.

The following are brief notes of the palatal and laryngeal cases I saw at St. John's Hospital in the summer of 1886. I pointed out the morbid appearances to either Dr. Harries or Dr. Campbell at the time, and some of them were later verified by the examination of my colleagues, and by visitors on the occasion of a lecture I gave on the subject at the Central Throat and Ear Hospital. It is interesting to note that *in every one there was lupus of some portion of the face;* and to this experience in the eleven cases I have seen, No. 2 is the only exception.

CASE 5.—E. G., a single girl, aged 20, had suffered from lupus for ten years. It had commenced at the lower border of the mastoid, whence it extended to the angle of the jaw. The uvula was distinctly clubbed, red, and nodulated (Fig. CLI.), and the fauces generally congested. The epiglottis was of a red colour, but the outline of its free border was sharp, and the valve free from thickening. The condition of the uvula strongly resembled that described in Gottstein's case.

FIG. CLI.—EARLY LUPOUS INFILTRATION OF UVULA.

CASE 6.—E. W., a female patient, aged 17; parents and family healthy. She had a cicatrix of lupus on her neck; her face was hideously disfigured by ulceration, which had commenced at the right angle of the nose, and had extended to cheek and lips, so that her mouth was dreadfully contracted. It was not possible to see her larynx well. What I did see appeared healthy, but the uvula was red, granular, and clubbed; on its surface as well as just above it on the velum was a shallow ulcer, with raised edge (Fig. CLII.). The patient had never experienced the least pain in swallowing. The voice was somewhat hoarse, but the change had been believed to be entirely due to the effects of the disease in her nose and mouth.

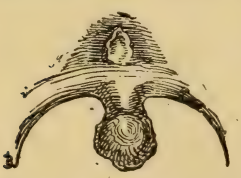

FIG. CLII.—EARLY LUPUS OF THE UVULA AND VELUM.

In another case (No. 7), that of E. D., a female child, aged 8, there was a similar affection of the uvula (Fig. CLIII.), not so far advanced, and a small shallow ulcer on the superior surface of the left anterior pillar.

FIG. CLIII.—EARLY LUPOUS ULCERATION OF LEFT ANTERIOR FAUCIAL PILLAR.

The historical notes of the following two cases are given in Dr. Campbell's own words from his pamphlet:

CASE 8.—'James V., æt. 24; father phthisical, mother healthy, also a brother and sister; some others died in infancy; cause unknown. Fifteen years ago had a *blow on the nose*, followed by ulceration, and shortly after again bruised his face by a fall. Ulceration spread over the whole face, except the forehead, destroying cartilages and septum of nose, attacking both pinnæ, and spreading downwards and backwards towards the back of the neck. Two similar patches of ulceration afterwards appeared on inner surface of left thigh, one on anterior surface of right forearm, and one on inner surface of left upper arm. Six months ago an iron bar fell on second toe of right foot, which soon after developed similar ulceration. There is also a patch on ulnar aspect of right wrist. May 17, 1886: All these lesions exhibit the typical characters of lupus. The teeth in both jaws are crowded, and the gums swollen and ulcerating. Mr. Lennox Browne diagnosed lupus of larynx and uvula.'

The ulcerations of the uvula in this case were deeper than in any of the others, and had decidedly raised margins (Fig. CLIV.). As to the larynx (Fig. CLV.), the epiglottis

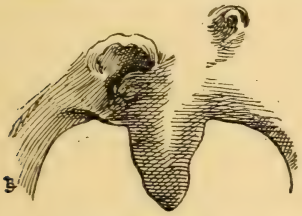

FIG. CLIV.—LUPUS OF UVULA AND SOFT PALATE.

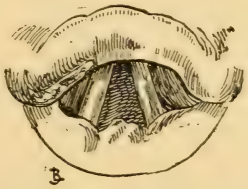

FIG. CLV.—LUPUS OF THE LARYNX.

was very pale and thickened, and at its right inferior margin there was slight worm-eaten ulceration, which showed some signs of cicatrization. The inter-arytenoid fold was thickened; the cords somewhat congested.

CASE 9.—'A. P., æt. 23; male; good family history. Disease began on the upper lip six years ago, and spread slowly. Was treated with the usual remedies. March 22, 1886: Nasal cartilages gone, and nostrils contracted; upper lip red, brawny, thickened; the nodules confluent and ill-defined; a solitary discrete, typical nodule on right cheek, near the nose. On the inner aspect of the right forearm there is a rounded purplish-red patch, with edges slightly raised and nodulated. Some cicatrization in centre of patch, which has, however, never ulcerated. June 8: Lupus of the larynx was diagnosed by Mr. Lennox Browne on this date.'

I did not make a drawing of this case because the laryngeal appearance so closely resembled that in the foregoing, and also in the next:

CASE 10.—Louisa F., aged 16, had suffered from lupus of the nose for five years. Her teeth were characteristically crowded. Lupoid manifestations were absent in the pharynx and fauces, but the epiglottis was pale, with nodulated and solid-looking thickening (Fig. CLVI.).

FIG. CLVI.—THICKENING OF EPIGLOTTIS IN LUPUS.

In addition to the foregoing, I have had one more case in my own practice:

FIG. CLVII.—INFLAMMATORY THICKENING AND NODULATION OF EPIGLOTTIS IN LUPUS.

CASE 11.—Eleanor B., aged 19, single, came under my care at the Central Throat and Ear Hospital on April 29, 1886, on account of ulceration of the nostril, of which there had been visible evidence for a year; but she had suffered from a certain sensation of discomfort in the anterior nasal pasage for a period fully three times as long. She was the youngest of six, all of whom were well and strong, and she herself had always enjoyed good health. Her father was alive, aged 67, and her mother had died at 48 of an abdominal 'tumour.' Lupous ulceration was seen to be destroying the cartilage of the left nostril, and was confined to that spot. The *palate* was normal in form, but rather congested. In the larynx (Fig. CLVII.), the epiglottis, which was very pendulous, was seen to be distinctly thickened, hyperæmic and flesh-like in texture, and both its free edge and superior surface were somewhat nodulated; the vocal cords and the rest of the larynx were normal. There was not the least discomfort experienced in the performance of any function of the throat.

I have recently seen this patient again (April 2, 1887). The ulceration of the nostril has healed under treatment by scraping and cautery. The laryngeal condition is unchanged.

In three cases (Nos. 2, 5, and 11) there was marked inflammatory redness of the laryngeal mucosa; in others there was slight congestion. Although in each that has presented laryngeal signs the epiglottis has been thickened, in only three (Nos. 2, 4, and 11) has there been nodulation; in none was this last-named lesion seen to the excessive extent pictured in text-books; and I cannot but think that observers have been too ready to see this nodular condition, as first figured by [20]Türck, or have ignored as lupous the more ordinary though less marked appearances delineated in the foregoing sketches. Ramon de la Sota, of Seville, as he has seen the disease, finds that there is always active hyperæmia, and distinguishes the lupous tubercle by its very red colour from the leprous tubercle, which is opaque, and of a turbid white. It is possible that the habitual use of tobacco among his patients may account for the constancy of the congestion. He also considers that lepra is characterized by a greater degree of anæsthesia. I have never seen a case of laryngeal lepra, but diminished sensibility is a marked symptom of lupus.

DIFFERENTIAL DIAGNOSIS.—The laryngeal diseases with which lupus is likely to be mistaken are *syphilis* and *tuberculosis*. While Gottstein considers confusion of lupus with the former the more excusable, Lefferts is of opinion that the demarcation between the two is distinct. This may be granted wherever there is concurrent lupus of the skin; but there is the superadded difficulty that some observers will not admit that necrosis of bone is a crucial test between the two. This, however, is the guide in my

own practice, and for it I have the support of Mr. Jonathan Hutchinson. The fact that a patient has brothers and sisters, both older and younger, free from any taint, is of really minor importance and I am entirely in accord with Neisser, who says that 'the *history*, as a rule, is comparatively worthless, whether it points to syphilis or not. In the former case, because lupus co-existing with syphilis presents no striking features; in the latter, because ulcerous syphilis often develops so many years after infection that the credibility of anamnestic data, in case syphilis is denied, is very slight.' It is far more important to remember, as the same author has stated, that while 'lupus has nothing in common with syphilis in any direction, both diseases may run side by side in the same individual.' The effects of *treatment* are of much greater assistance. In lupus, mercurial treatment always aggravates both the subjective and objective conditions, and an interesting example of this fact is recorded by Ramon de la Sota. Improvement, therefore, of the condition, under long-continued medication by mercury, must inevitably confirm our suspicion of a syphilitic origin, or, at least, of the co-existence of a syphilitic taint.

The laryngoscopic appearances of lupus are far more allied to those of tubercle, but the comparative slowness of the pathological process, the absence of pain, cough, and emaciation in the former, and, above all, its disposition to undergo repair in one part concurrently with extension in another direction, should not make diagnosis difficult. [21]Hunt well puts it that 'there are two general conditions of the mucous membranes of the larynx and pharynx which strike one in the majority of cases, *anæmia* and *anæsthesia*;' the former distinguishes it from syphilis, the latter from tuberculosis. The cases of lupus in which there is pain are as rare as those of tubercle in which there is none. A strong point of differentiation from both syphilis and tuberculosis is the fact that lupus of the larynx is almost always supra-glottic, and that the vocal cords generally escape. All these points will indicate that although there may be certain morphological resemblances between lupus and tuberculosis, the clinical characteristics of the two maladies are thoroughly distinctive.

One more point: stenoses in lupus are due to a general matting together of the inflamed tissues, as shown in Fig. CXLVII., p. 247, and are very different from what is observed in syphilis or in laryngeal manifestations of rhino-scleroma. It is hardly necessary to go into detail as to the points of differentiation from *carcinoma*, and I am unable from personal experience to speak of *lepra*.

PROGNOSIS, COURSE, AND DURATION.—The forecast of lupus of the throat may be generally considered as favourable from the vital point of view, though when the larynx is attacked some danger is to be apprehended at a later stage from cicatricial narrowings of a most unyielding character. The peril is all the greater because interference with these scars by incisions is not unlikely to lead to recrudescence of the ulceration. The course of lupus is always slow, and while it may possibly, in a few cases—not so few, perhaps, as was formerly believed—terminate in general phthisis (? pulmonary luposis), it more often undergoes a spontaneous process of cure by evolution. It is impossible to make any prognostications of value as to the duration of active disease; and in many cases, even when ulceration is arrested, there is lifelong discomfort in speech and respiration.

TREATMENT may be divided into: 1. Abscission and scraping; 2. Cautery, galvanic or actual; 3. Chemical caustics and germicides; 4. Constitutional remedies of the analeptic type.

Abscission of a uvula when attacked by lupus is a sound procedure, and when *efficiently* performed the good effects of *scraping* are quite as marked in lupus of a mucous as of a cutaneous surface; but it must be thorough, and the slightest nodule or spot must be carefully eradicated. Either of these measures may be performed by the *galvano-cautery*, which affords in this disease, as in all others of the throat and nose, much better results than any form of actual cautery, for it is at once safer and more convenient of employment. After scraping with an ordinary raspatory, *chemical caustics* may often be usefully applied: the best is the perchloride of mercury, 1 to 500—either in powder or paste. Of *germicides*, Ramon de la Sota speaks highly of lactic acid, and from my experience of that remedy in faucial diphtheria and tuberculosis, I should certainly expect it to be of good effect in this disease also. I have not found applications of iodine, iodoform, or of mineral astringents of the least use in lupus of the throat. **Tracheotomy**, for the reason that glottic stenosis is a rare complication, is not often necessary, but in the few cases in which it has been performed the operation is reported to have always had a favourable influence on the progress of the disease.

A FEW WORDS remain to be said regarding a form of pharyngeal and laryngeal disease, in which a syphilitic manifestation occurs in a person of scrofulous, strumous, or lupous diathesis. As to etiology, we have nothing to add to what has been said in regard to so-called scrofulous ulceration of the pharynx at pp. 199, 200, and to repeat that while the diagnosis of faucial, pharyngeal, or laryngeal lupus, if unaccompanied by a previous or concurrent cutaneous manifestation, is to be considered dubious, the existence

of necrosis of bone should in our judgment at once point to the probability of the case being primarily syphilitic.

Two instances are appended as types of lesions that are often ignorantly called *lupoid* or *lupoid syphilis :* they are inserted in this situation *solely* to enforce the question of *diagnosis*. The first is an illustration of a laryngeal affection which, occurring in a patient phthisically inclined, strongly resembled lupus, but without cutaneous corroboration, and with therapeutic evidence of syphilis. The second is one of cutaneous disease of the character of lupus, but with ulceration of the palate and with laryngoscopic signs which clearly establish it to be also syphilitic.

Case 12.—Elizabeth C., aged 26, married eight years, and with one child 5 months old, came under my care at the Central Throat and Ear Hospital in March 8, 1886, complaining of soreness of the throat and loss of voice, which had existed for seven weeks, and was believed to be due to cold. Her *voice* was reduced to a whisper. There was a slight dry *cough ;* rather worse at night. She said that her *breathing* was short at times, but *deglutition* was easy and normal. The *pain* was described as a smarting, with dryness on the larynx. Her tonsils were rather enlarged, especially the right ; the back of the pharynx was granular. Beyond the graphic note of alteration in the configuration of her larynx as rendered in facsimile on Fig. CLVIII., no remark was made on her case-

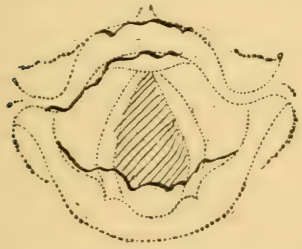

Fig. CLVIII.—Laryngeal Appearance, March 8, 1886.

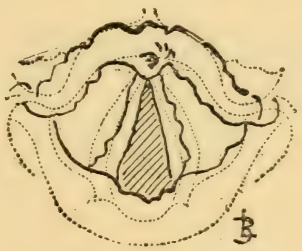

Fig. CLVIII.*—The same, February 18, 1887.

paper as to laryngeal change beyond 'slight congestion.' On auscultation, 'some dulness was noticed at the front of left apex, but no râles, and good inspiration.' She was ordered hypophosphites and cod-liver oil ; she only attended for three weeks.

On February 18, 1887, this patient returned and came under the care of my colleague, Mr. Jakins. She stated that she had got much better by previous treatment, but that for the last five months her sore throat had returned, her *breathing* was more difficult, her *taste* was impaired, but there was *no pain* whatever. Her tongue was seen to be glazed, deeply cracked and superficially ulcerated. Her uvula was swollen and thickened, and it, as well as the soft palate and anterior pillars, were thrown into thick folds with deep rugæ between (Fig. CLIX.). The back wall of the pharynx was still somewhat granular. The nodulated and thickened condition of the larynx previously noted had decidedly increased, as may be seen by comparison of the laryngoscopic figure (CLVIII.*) with that first delineated, and almost exactly simulated that of true lupus. The lungs (repeatedly examined, and by various members of the staff) appeared quite healthy, both on percussion and auscultation. In consultation with Mr. Jakins, I expressed an opinion that the case was now undoubtedly syphilitic, and the result of

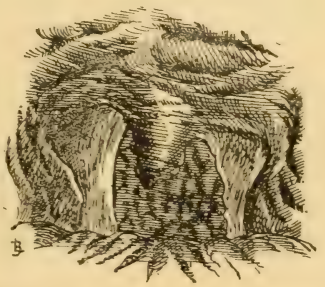

Fig. CLIX.—Faucial Appearance, February 18, 1887.

treatment by biniodide of mercury, combined with cod-liver oil and antisepic oro-nasal inhalations, soon confirmed the diagnosis.

It is to be noted that in this case there is no manifestion on the skin, but there is existence of a condition of the tongue more allied to syphilis than to lupus, and a sister is in that respect similarly affected. There is also doubtful evidence of incipient tuberculosis. In both this and the following, the syphilitic dyscrasia was probably congenital or inherited, though sterility for the first seven years of married life in the first case is capable of other interpretation.

CASE 13.—Jane S., aged 20, single, attended the Central Throat and Ear Hospital as an out-patient in November, 1885, and again in February, 1887. The following history was obtained at the time of her second attendance: She thinks she had always been 'ill' from birth and in early life, but remembers that she was quite well at 7. When 12 years old was bitten on the nose at the inner canthus of the right eyelid by a gnat; remembers, however, that there was a scar on the nose before this, but never a sore. [There are also several depressed circular scars on the thighs and calves, of the origin of which she has no recollection.] After the bite she had an abscess of the nose, and about this time her mouth became bad; an ulcer formed in the palate and proceeded to perforation. She was treated at various hospitals and convalescent homes on and off for two years, and her nose nearly healed, but the right eyelid discharged and was drawn down by cicatricial fluid contraction; it remained thus until November, 1885, when she lost her voice without pain or soreness. This improved under treatment here, but has never been completely recovered. Soon after this time the nose became again affected, and spread from the right inner canthus downwards to the cheek, and the patient was admitted to Middlesex Hospital under Mr. Lawson. At that time the eyelid, although drawn down, was not ulcerated. After a stay of three or four weeks she left, with the patch on the nose and cheek *quite healed*.

FIG. CLX.

During the last month the disease has spread to the inner half of both upper and lower lids. It involves the angle between the canthus and nose, also the bridge of the nose, and creeps superficially down the right side of the nose to the cheek, and it has now for the first time involved the ala of the right nostril, a portion of which is destroyed.

There is a central perforation of the hard palate of the size of an ordinary lead-pencil, jagged eroded ulcers along the central raphé of the soft palate, and adhesion of the uvula to the right faucial pillar. With the *laryngoscope* (Fig. CLX.) the epiglottis is seen to be red and thickened, and with a slight fissure in the centre; there is no active ulceration, but concurrently with the inflammatory thickening the free edge is notably white and nodulated. With the exception that the epiglottis is inflamed, the appearance of the free edge strikingly resembles the coloured illustrations of syphilis in Figs. 61 and 67, PLATE VII., at the end of this book. The vocal cords are of a dirty reddish-grey colour, and, so to speak, degenerated in substance, but so far as can be seen are not ulcerated.

The *teeth* are irregularly shaped, small, and pegged in the upper jaw; more regular in the lower. Nothing abnormal in the optic discs can be discovered with the ophthalmoscope. The *family* history is apparently good.

In the second case the appearances of the face, eyelid, and larynx strongly resemble those of lupus; but necrosis of the hard palate, and certain other commemorative points, clearly establish a syphilitic origin of the malady. The history of the gnat-bite

would point to traumatism as the exciting factor of the ulceration, and might encourage a thought that the truly lupous nature of the disease was established ; but the pre-existence of a scar renders such an hypothesis untenable. I lately (1887) saw a very similar case in consultation with Dr. Campbell. There was a succinct history of a blow on the nose from a stone as the first cause of a nasal disease which had destroyed both bone and cartilage, but on cross-examination there was clearly pre-existence of inherited syphilitic lesions. There is, of course, equal probability that traumatism may excite to active disease in the syphilitic as in the lupous dyscrasia.

LEPROSY.

Leprosy of the pharynx and upper air-passages is limited to the so-called tubercular form of leprosy : that which attacks the skin, and is especially manifested in those patients in whom the face is so affected. Its appearance in the throat, nearly every part of which may be attacked, is a comparatively late occurrence. The interest of the disease is, in the present stage of science, of purely clinical interest ; for not only is no treatment of any avail, but, as stated at page 221, the disease is secondary to cutaneous evidences, and this both in the date of its invasion and in its importance to the well-being of the patient.

The manifestation of a primary leprosy in the throat is indeed even more doubtful than that of lupus.

It may be useful, as the result of my visit to the Leper Establishment in Robben Island, South Africa, and in consideration of the greater attention recently given to the subject, to state concisely the appearances as I have observed them, and as are remarked by other standard authors.

Symptoms, Subjective.—The **voice** is, as in lupus, the earliest indication of leprous invasion, and is of very much the same character. It may be described as commencing with ordinary hoarseness and the so-called nasal *timbre ;* it is sometimes characterized as shrill, but is, I am informed, and as I observed in the cases I saw, more often distinguished by an actual though gradual diminution in pitch, to be later followed by even complete suppression.

Another similitude to lupus is that there is but seldom **mogiphonia**, pain in speaking ; **dysphagia**, difficulty, or **odynphagia**, pain, in swallowing, or, indeed, inconvenience in any functional exercise of the throat. I saw one case at Robben Island in which there was extensive and deep ulceration of both the hard and soft palate,

the whole surface of the tongue to its root, and of all the visible pharynx, with destruction of the uvula, but in which there was absolutely no complaint of pain, and I remark that in[22] Morell Mackenzie's able essay, out of twenty-five cases tabulated, dysphagia was only present in one. This author justly observes that 'it is wonderful how slight the pain often is, even in cases where the whole mouth, tongue, and fauces, as well as pharynx, are extensively involved.' Mackenzie doubts occurrence of leprous complications in the throat 'in the purely anæsthetic form of the disease,' but surface anæsthesia appears to be the characteristic of all forms of leprosy, and is decidedly distinctive of its presence in the regions now under consideration. With regard to **dyspnœa**, the same may be said as to absence of urgency, for cases have been reported in which respiration was unaffected, even though the calibre of the glottis was so narrowed as to hardly admit a straw. Tracheotomy is indeed but seldom indicated, and I did not find a single recorded case in which the operation had been performed at the Cape establishment. Death by œdema of the glottis is, however, said to be not uncommon. The sense of **smell** is often impaired or altogether lost when the nose is extensively invaded, which is not infrequently the case; but **taste**, though somewhat deadened where perception of odour is lost, is seldom entirely abrogated.

The OBJECTIVE signs of leprosy in the *pharynx*, in its early stages, are difficult to diagnose from those of lupus. They are hyperæmia followed by papillations which increase in size, and by indurations which become, later, fissured and ulcerated. This condition generally commences in the uvula, as does lupus, and then extends to the whole palate, soft and hard, and lastly to the base of the tongue (lingual tonsil). Some cases I saw of leprosy in the tongue—other corroborative evidence being unconsidered—would be easily mistaken for tertiary syphilis. Loss of tissue is decidedly more common in lepra than in lupus, but perhaps the most distinctive feature between the diseases is 'the pale, yellow, thickened, glazed look that characterizes the whole of the mucous membrane of the mouth and throat, an appearance which might almost suggest that all the parts had been infiltrated with tallow' (Mackenzie). [23]Hillis, of Demerara, finds this 'pale pallid bloodless condition consecutive to the earlier and very transitory stage of congestion, at a very early stage of every case of tuberculated leprosy which affects the throat, and he likens it to that of a person suffering from pernicious anæmia, though the patient may not be suffering from this disease or be otherwise bloodless. I have seen a modified appearance of this nature in advanced cases of lupus.

In the *larynx*, it is very difficult, and indeed generally impossible, to say what is the condition below the level of the epiglottis, for that cartilage is always so enormously thickened by infiltration (Fig. CLX. A) as to prevent any movement in phonation or otherwise, and so to constitute an insurmountable obstacle to further inspection. At a later stage ulceration breaks down the tissue, and Mackenzie has seen one case in which, the epiglottis being eaten away, he was able to observe a similar thickening of all parts forming the upper circumference of the larynx—namely, arytenoid cartilages with the ary-epiglottic and inter-arytenoid folds. The cords also were infiltrated and ulcerated. I have not been so fortunate as to obtain such a view, and my observations have led me to believe that in leprosy, as in lupus, though there is considerable general thickening there is not, as a rule, a tendency to separate tubercles or nodules. Ulceration is comparatively rare, and loss of substance appears to result from that same curious process of atrophic absorption of the vital tissues, which is characteristic of the disease when attacking the hands or feet. In forty cases tabulated by Hillis, the epiglottis was markedly thickened in eleven, destroyed by ulceration in one, so that 'only a stump' remained; but in only two instances are distinct tubercles in this situation recorded. The disease may extend to the trachea and bronchi, but respects the lung tissue and also the œsophagus. A bacillus of leprosy has been discovered by Hansen, which is not unlike that of lupus, and it is impossible not to see that there is a marked family likeness between these two diseases. The frequent use of the word 'tubercle' when describing leprosy, is somewhat unfortunate; nevertheless the malady has as near a relationship to tuberculosis as has lupus. Granting that lupus is, as Marty has said, an attenuated tuberculosis, may not leprosy be described as a tuberculosis still more attenuated, as regards its slowness of progress and duration, but more virulent in its contagiousness and in the extent of its ravages, and this both in its attacks on the skin and on the mucous membrane? It is possible that, at some not distant date, varieties of bacillus may be found in the two varieties of leprosy.

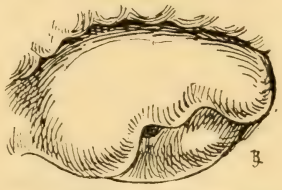

FIG. CLX. A.—LEPROSY OF THE LARYNX.

[24]Thin has well described the morbid anatomy of leprosy in these situation, and the reader who is further interested cannot do better than refer to that authority.

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CHAPTER XXI.

BENIGN NEOPLASMS OF THE LARYNX.

(Figs. 80 to 87, PLATE IX.)

The figures in the text are *intentionally* given as simple reproductions of the rough original sketches made in the author's note-book or on hospital case-papers. Finished illustrations are to be found in the coloured plates.]

No throat affection has received such an amount of attention since the introduction of the laryngoscope as has been devoted to new formations in the laryngeal cavity, and the remark of Von Ziemssen, that 'the literature of the laryngoscopic period abounds in recorded observations to a degree almost oppressive,' may be applied especially to this department of laryngology. The reader who would wish for the fullest information as to the origin, pathological varieties, and almost individually various treatment of these affections may be referred to the works of [1]Czermak (1863), [2]Türck (1866), [3]Von Bruns (1868), [4]Gibb (1869), [5]Morell-Mackenzie (1871), [6]Mandl (1872), and numerous others, down to [7]Fauvel, who in 1876 published a volume of nearly 1,000 pages, fully half of which is occupied by a detailed account of 300 cases of growth under his own care. The practitioner, therefore, need not be at a loss for information on the subject, and it will indeed be strange if he does not find somewhere recounted the homologue of any case which may come under his observation, though he will be somewhat perplexed by the different lines of treatment he is recommended to adopt by the various authors, and the variety of instruments he will be advised to purchase.

The consideration of this interesting though decidedly rare form of laryngeal disease—at least as presented to the observation of general physicians and surgeons—will in the present work be limited to the consideration of comparatively few practical points, with illustrative delineations of the laryngoscopic appear-

ances and brief notes of cases likely to be of diagnostic and therapeutic value.

This chapter is, moreover, confined to discussion of that class of laryngeal growth which may be considered as *benign*—benign, I mean, in a clinical as well as a pathological sense. The principal clinical differentiation is that of non-recurrence, and is for the most part a serviceable one. Nevertheless, a small class of laryngeal papillomata exists in which the growths, though truly benign, nevertheless recur. Such are those referred to in this chapter as Cases 10 and 16; in both, recurrence in a measure only represented further development due to previous imperfect removal. In the second there was also a distinct occurrence in fresh situations. This is characteristic of warts elsewhere.

Etiology. — Without doubt the most common cause is hyperæmia, and naturally all which tends to excite congestion will predispose to the production of new formations. Catarrh, the use of the voice during catarrhal attacks, certain occupations accompanied by the inspiration of noxious vapours, may all be considered predisponents of laryngeal growths.

The papilloid formations in tubercular laryngitis can rarely be considered as true tumours, and even those who think otherwise would seldom counsel endo-laryngeal operations for their removal. There can be no doubt, however, that syphilis, predisposing as it does to obstinate catarrhal inflammations with a great tendency to hyperplastic deposit, does play an important part as a factor in the production, not only of condylomata, but also of true laryngeal neoplasms. The case affording the coloured illustrations, Fig. 81, Plate IX., is one of many in point.

Growths occur usually at middle age, but may arise at an early period of life, or may even be congenital. They are naturally seen more frequently in males than in females.

It is almost impossible to give any estimate as to the comparative frequency of occurrence of these formations, owing to the fact that doubtless many cases of slight loss of voice due to the presence of small growths have not been investigated with the laryngoscope. On the other hand, those engaged in special practice may see a very undue proportion of cases of growth among the throat affections coming under their notice, from the fact that persistent impairment of voice is a symptom for which medical relief is early sought.

Fauvel 'does not hesitate to proclaim loudly the great frequency of polyps of the larynx,' because he has seen 300 cases in fifteen years; but as he does not give the proportion of these cases in

relation to all other diseases of the throat which he has treated, nor the number of other cases observed in France during the same period, the fact as a statistic is of little value.

Mackenzie saw in ten years over 100 cases; so it is possible, even allowing for the difference of area of France and England, that these growths are more common in the former than in the latter country. If so, a cause may probably be found in the habit that Frenchmen have of speaking always *à haute voix* and in the open air, as well as in the abuse of tobacco, and the taking of injurious spirituous drinks.

[8]Newman states that they constitute only a small proportion of the chronic maladies of the larynx, certainly not more than 2 or 2½ per cent. My own experience leads me to think that the proportion is still smaller.

The following examples from my note-book illustrate the fact of undue vocal effort and professional voice-use as a factor of importance in the production of neoplasms. To avoid reiteration, they are completed by stating the mode of treatment adopted and the result thereof. For purposes of reference, the cases are numbered.

CASE 1.—Miss H. L., aged 21, residing near Leicester, consulted me on June 21, 1879, on account of a huskiness of the voice, and an occasional discomfort in swallowing, especially hot liquids or *piquant* dishes, of which she partook freely. Her voice had been a fine mezzo-soprano, but had been much tried because she had often sung to excess after a day's hunting, and in other circumstances very unfavourable to it. I found a small cystic growth on the left side of the epiglottis, as indicated in the drawing (Fig. CLXI.). This was at once *incised*, and *caustic applied*. There was also a minute vascular prominence at the free edge of the right cord at its centre. *Applications of mineral astringents* always reduced the small hyperæmic growth on the cord, and gave improvement to the speaking voice; but the singing voice was never restored. I saw this patient occasionally for several years, and observed that the neoplasm remained for the most part in a passive condition: she resigned herself to her discomfort, and did not care to undergo the fatigue of treatment. The growth on the epiglottis quite disappeared after the first incision and cauterization.

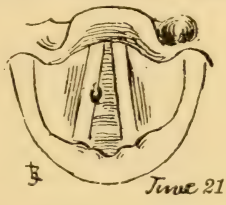


FIG. CLXI.

CASE 2.—Captain S., aged 49, who had served in a cavalry regiment for some years in India, but had retired nearly ten years, consulted me on June 4, 1880, on account of an occasional loss of voice and tickling cough, which had existed for fifteen years. His laryngeal condition was identical with that depicted on Fig. 83, PLATE IX., there being a small vascular polyp attached by a small pedicle to the right cord which flapped up on phonation. It was quickly removed by the *Sponge propang*, applications of chloride of zinc being made for a few days after, with the result that the cough was entirely removed, and the voice became stronger and more certain.

CASE 3.—Mr. T. J., aged 60, formerly a sergeant in the army, and still drill-sergeant to a Volunteer corps, keeping also a public-house in Carmarthenshire, consulted me on June 13, 1879, on account of complete loss of voice for six weeks, with gradually

increasing hoarseness for eighteen months. Had not always been temperate, and acknowledged to syphilis in early life. He was admitted into the Central London Throat and Ear Hospital, and after a series of operations, principally with the *Snare*, his larynx was cleared of the several growths shown in Fig. CLXII. His voice, though it remained somewhat gruff, was sufficiently restored to enable him to resume his drill duties.

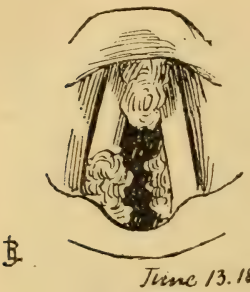


FIG. CLXII.

CASE 4.—Mr. C. B. L., aged 24, a theological student, consulted me, April 25, 1885, by the advice of Mr. Taylor, New College, Oxford, and of Dr. Dyer, of Ringwood, on account of loss of voice, the cause for which was plainly apparent in the laryngeal mirror, as shown in the accompanying sketches, Fig. CLXIII. His history was interesting, and to the following effect: As a boy he had sung treble in a school choir up to the age of 15 or 16, singing through the change of his voice in chapel, but discontinuing to take part in the glee club of his school. His voice on settling became baritone. Commenced singing again with Mr. Taylor on going to Oxford, but he

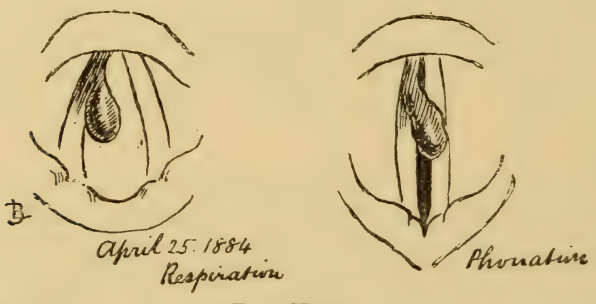


FIG. CLXIII.

suffered frequently from hoarseness. His vocal disability had become permanent since the previous Michaelmas Day (September, 1884). For some time previously had lost all power of producing soft notes in singing, and in conversation had either to force or to pitch his voice very deeply. The growth was *snared* at the first attempt, and purity and strength of vocal tone quickly followed.

CASE 5.—E. A. S., aged 39, a schoolmaster, came under my care July 13, 1885, on the recommendation of the Rev. Henry Arnott, F.R.C.S.

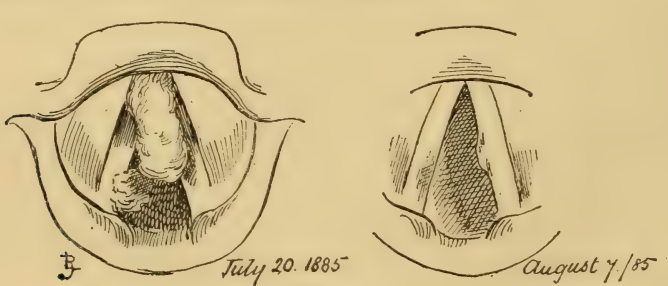


FIG. CLXIV.

The patient stated that for nine months his voice had been becoming weaker. The loss of power was always greater after his work, and in the evening would be quite lost.

He had formerly sung well; but his singing voice had been gone for a year or two, and lately his respiration had become impeded. His father had died of asthma.

I found that his voice was reduced to a hoarse whisper, the cause of which was quickly revealed by use of the laryngoscope (Fig. CLXIV.).

He was admitted into the hospital on July 20, and at once submitted to operative treatment by the *snare*. On removal of the growths on his vocal cords, it was observed that there were others situated beneath the glottis. These also were removed at subsequent sittings, and the patient left the hospital to return to his vocation on August 7. He subsequently informed me that his speaking voice was quite regained, but he has not since been able to sing. A recent communication assures me that he has continued well.

CASE 6.—George S., æt. 39, a costermonger, applied as out-patient at the hospital on December 3, 1885, on account of complete loss of voice. He stated that his first symptom dated from nine months previously, when he complained of a tickling and burning sensation in the larynx. His *voice* began to 'break' about this time. It gradually became

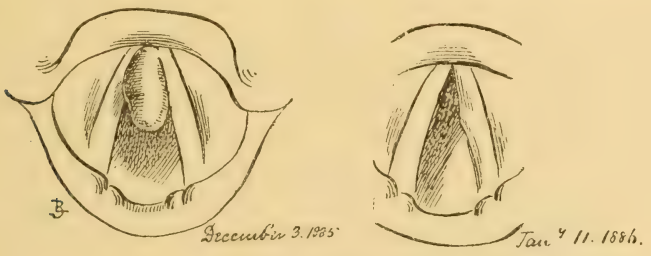


FIG. CLXV.

weaker until the date of his application. It was now reduced to the merest whisper. He complained of a slight dry cough, referred to a desire to clear his throat. His *breathing* was somewhat short and laboured when he first woke, and both it and his power of swallowing were worse after use of his voice.

On laryngoscopic examination (Fig. CLXV.) a large pendulous and semi-transparent growth was seen to occupy the anterior half of the larynx, and was apparently attached to the left vocal cord.

The patient was demonstrated to my class on that day, and on December 7 it was entirely removed at the first attempt with a *Gibb's Snare*. On removal it at once collapsed, and was shown, as had been suspected, to be cystic in character. The contents, which were clear and colourless, were probably serous. The patient at once spoke with phonetic tone, and ten days after, in spite of instructions to the contrary, he resumed his occupation, and commenced to 'call' in the streets. The result was that he presented himself on January 11, 1886, with a congestion of his left cord, and a slight swelling at the point of attachment of the growth. He was admitted an in-patient for a fortnight, so as to give him complete vocal rest. His larynx was touched daily with a solution of chloride of zinc, and the Leiter cold coil applied. On January 25 he was discharged cured.

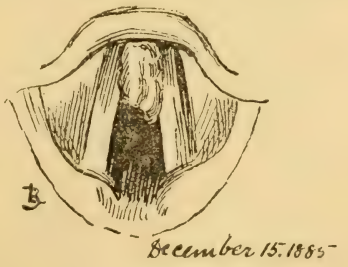


FIG. CLXVI.

CASE 7.—Fig. CLXVI. represents the laryngeal condition of a gentleman, Mr. B., aged 27, who consulted me for loss of voice on December 15, 1885. He dated his trouble from June 8, in that year, when after coaching his college crew in a boat-race at Oxford,

which entailed much shouting from the river-bank, he found his voice entirely gone. It had not since returned, but, on the contrary, had steadily deteriorated.

Of the eight cases affording coloured illustrations to this work on PLATE IX., two were hawkers, one a singer, and one an actor. One other case (No. 9), to be reported later in this chapter, arose in a singer, so that of twenty-five cases of which I give notes, thirteen, or just over half, are directly attributable to vocal causes; and this is, indeed, the usual proportion.

Since this question of voice-use is one of great importance, it is to be noted that in the foregoing cases, taken indiscriminately from my own experience, one or more examples of almost every functional cause of laryngeal irritation are to be found.

Thus constant use of the voice in close rooms with surrounding noise, as in a schoolmaster, affords one example (Case 5); of the same in all conditions of weather, as in hawkers and costermongers, there are three (Case 6, and those of Figs. 82 and 86, PLATE IX.); daily use of the voice as a choir singer (Fig. 83); as an actor (Fig. 81); forcing the registers of the voice, as by shouting or singing under adverse conditions, three (Cases 7, 1, and 9); military duty, two (Cases 2 and 3); continuing to sing through puberty, one (Case 4).

These records illustrate more forcibly than any mere abstract dictum, the imperative necessity that exists for laryngoscopic examination in every case of loss of voice that comes under notice, whether or not there appear to be constitutional or functional explanation, or more directly visible causes in the pharynx, nares, etc.

PATHOLOGY.—The morbid anatomy of benign neoplasms, as applied to the larynx, is very little different from what is known of similar structures generally. The distinctions are chiefly clinical, and are amply discussed in my remarks on etiology and semeiology. I shall, therefore, content myself with enumerating the principal varieties to be found in this region in their order of frequency, and under the head of physical signs enumerate their macroscopic appearances as seen in the laryngeal mirror.

The most common of laryngeal growths are *papillomata* or warty—single and multiple—*fibromata* or fibrous, *fibro-cellular* or true *polypi*, *cystic*, *myxomata* or mucous, *adenomata* or glandular, *lipomata* or fatty, and *angeiomata* or vascular. Not unfrequently more than one variety is found in different sections of a specimen. The first three kinds are the most usual, the others are uncommon, though cystic tumours are by no means so rare as was

supposed before the almost simultaneous publication of monographs by [9] Moure and [10] Cervesato. Newman mentions *ecchondroses* or *ecchondromata*, but these are usually outgrowths from the cartilages and of a different character from the intra-laryngeal neoplasms at present under consideration, which take their origin in the soft parts.

The most frequent situation for growths is on the vocal cords, and they are indifferently found on the superior, inferior, and free borders. The character of the neoplasms in this situation is that of the first five varieties; the cause is chiefly vocal abuse, and a constitutional dyscrasia is by no means a necessary or usual predisponent. The contrary of this last condition obtains with regard to formations in the posterior commissure; growths in this position are rarely exhibited in a patient free from syphilitic or tuberculous taint. On the epiglottis the growths are usually cystic or adenomatous. The following is an example of a papilloma in this situation:

Case 8.—Mr. C. H. G., æt. 42, consulted me on January 5, 1882, by the advice of Dr. Scott, of Bournemouth, on account of *aphonia*, which had existed for nine months, and supervened on a previous hoarseness of four or five years' duration. There was no *cough* except a slight 'hemming' to clear the throat; nor was there pain nor any other symptom. With the laryngoscope (Fig. CLXVII.) a warty growth was seen to be attached by a small pedicle to the left cord, and another more sessile was situated on the epiglottis. On removal by *snare* and *probang*, both were found to be of the same histological character, and to be of papillary structure.

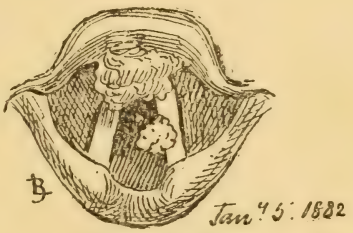


Fig. CLXVII.

Symptoms: A. Functional. — Although it is of interest to describe the subjective symptoms that characterize laryngeal growths, it is to be understood that their frequency and severity vary greatly with the size and situation of the new formation. No diagnosis can be more than tentative which is made by observance of functional signs alone, and though presence of a growth may be suspected, its existence and nature can only be surely ascertained by physical (laryngoscopic) examination.

Voice is impaired in nine-tenths of the cases under observation, and the alteration may vary from slight hoarseness to complete aphonia, there being a characteristic variation in vocal tone and power during the utterance of very short sentences. Another vocal peculiarity, on which [11] Carroll Morgan has dilated, is that of diphthonia or double voice, to be seen in the cases of small

growths; this gives rise to interruption of the cords and division of the glottic chink into two.

Respiration is impeded in about one-third of the cases, and the embarrassment may reach to serious dyspnœa in about 15 per cent.

Cough, when present, may be an indication of the situation of the growth at one of the cough-spots alluded to by Stöerk (p. 91). Very frequently the act simply represents an endeavour to relieve a sense of tickling or of a foreign body. The expectoration is scanty, and sometimes contains traces of blood or minute portions of the growth.

Deglutition is rarely affected unless the growth be on the epiglottis, in the hyoid fossa, or bordering on the anterior wall of the pharynx.

Pain is seldom a symptom of benign growths, though the sensation of a desire to get rid of a foreign body is frequently complained of.

B. PHYSICAL.—Physical characters as to colour, form, and texture will vary not only according to the position, but also with the pathological varieties of the growth.

Examination of the various figures in PLATE IX., and the drawings in the text, will show the characteristic laryngoscopic appearances and the most usual position of those growths which are more commonly witnessed.

Papillomata are to be seen in Figs. 81, 82, 84, and 85, as more or less pink, grey, or white excrescences, with a cauliflower-like or truly warty surface. They vary in size from that of a small pea to dimensions which may obscure the glottic lumen. They may be sessile or pedunculated.

Fibromata (Fig. 86) are generally hard, but their consistence varies considerably, and they are usually sessile and of even contour; but occasionally the surface is somewhat rough.

Fibro-cellular growths or true *polypi*, sometimes called soft fibromata (Figs. 80, 83, and 85), are usually small, and are smooth, red, and semi-transparent.

Cystic growths, not given in colour, but shown in outline in illustration of Cases 1 and 6, are most common on the epiglottis, where they may attain a considerable size, and are generally of the nature of retention cysts. Their colour in this situation partakes of that of the cartilage with somewhat increased hyperæmia.

Myxomata are rare; they are pinker and more translucent than papillomata.

Adenomata (Fig. 86) are also rare; they are generally seen to grow from the epiglottis, and give the appearance of a more solid structure than a cyst. Their surface is mamellated.

Angeiomata or vascular tumours are very uncommon, and are probably of the nature of *hæmorrhoids*. A coloured illustration drawn by me is given in Mackenzie's monograph on growths in the larynx. It represents a dark bluish-purple growth of mulberry form and colour, and was situated in the hyoid fossa.

I am not in the habit of employing the laryngeal sound for further diagnosis of the situation or attachments of growths, for

such facts, if not ascertainable on examination, are soon revealed in the treatment of the case. Nor is external palpation or auscultation of the larynx of any diagnostic value whatever.

C. Miscellaneous.—In truly benign formations there is seldom any external evidence of the disease, nor does the general health often suffer unless respiration or deglutition be seriously interfered with.

Treatment.—As before hinted, the treatment of such cases can only be undertaken by those having competent experience both in examination and manipulation with the laryngoscope; but as familiarity with the use of this instrument is each year becoming more general, and the specialist's aid may not always be available, my desire is to render this book of service to all classes of practitioners. The directions, therefore, to be given for treatment of this as well as of other diseases will be such as are at least not likely to do harm, and will be found fully efficacious for the majority of cases to anyone fairly experienced in introducing instruments within the larynx.

The considerations which should guide the surgeon who undertakes this treatment were brought under the notice of the profession by me in a paper read before the Medical Society of London, and published in the *British Medical Journal*, May 8th, 1875. It was reprinted entire in my last edition, and attracted some attention both from opponents and adherents. Though still firmly convinced that my conclusions were in the main sound, I do not again reproduce the article *in extenso*, partly for reasons of space, and also because the cautions then given being now more generally appreciated, there is no necessity for their repetition.

The propositions I submitted for consideration were the following:

'1. Attempts at removal of growths from within the larynx are not in themselves so innocuous as is generally believed, but, on the contrary, direct injury of healthy parts of the larynx, leading to even fatal results, is by no means of unfrequent occurrence.' Of this several examples were given. The risks may be avoided by the use of guarded instruments.

'2. The functional symptoms occasioned by benign growths in the larynx are in a large proportion of cases not sufficiently grave to warrant instrumental interference.' On this point I am willing to admit that I may have underrated the inconvenience, professionally and socially, of mere loss of voice; but I still submit that it is not sufficient to warrant operations which are in any

sense dangerous to life. The truth of this and of the next proposition has, indeed, been conceded by [12] Morell-Mackenzie in the following words:

'There are a few cases in which operative procedure is not required. Thus small growths in the epiglottis or ventricular bands, which cause little or no inconvenience, may well be left alone. This remark especially applies to fibromata, which grow much less quickly, and are more frequently arrested in their development than other growths. In these cases, all that is necessary is to make a periodical examination of the larynx, once or twice a year, to see that the neoplasm does not increase in size. Further, it sometimes happens that where, in consequence of the advanced age or occupation of the patient, the voice is of little importance, no treatment need be adopted unless the respiration be also affected.'

The number of persons to whom the advice (appropriate to those subject to benign growths in other regions of the body) to watch and wait is given, must be very small; but, without doubt, there are a very large proportion of cases which never require treatment, and, if left to themselves, never assume a serious aspect. There is no reason to doubt that, while many of these formations remain thus stagnant, a large proportion would, on no less authority than that of Virchow, if untreated, 'frequently disappear spontaneously, being subject, as they are, to slow atrophy and resorption.'

'3. Many of these new formations will disappear, or be reduced by appropriate local and constitutional medical treatment, especially when of recent occurrence.' The following is an interesting example out of many I have seen of a distinct cure of small growths by early local treatment:

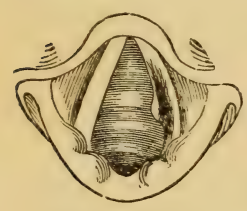


FIG. CLXVIII.

CASE 9.—Miss T., a student of singing, aged 19, had for three months lost her singing voice, and for two months had been distinctly hoarse in ordinary conversation. The condition, as seen with the laryngoscope at her first visit, February 3rd, 1875, is represented on Fig. CLXVIII., namely, a small growth on the left vocal cord, surrounded by bright-red localized congestion. After a week's daily application of a solution of chloride of zinc, the hyperæmia was removed. In a month she was quite well. Seen at frequent long intervals after, her voice remained perfectly clear.

'4. Recurrence of laryngeal growths after removal *per vias naturales* is much more frequent than is generally supposed.' Doubtless this is sometimes due, as in Cases 9 and 10, to incomplete removal in the first instance, but in others from irritation of a mucous membrane having a neoplastic proclivity. Case 15 illustrates both these points, and the experience of every practitioner would afford others:

CASE 10.—Mr. T. F., a baker, first seen on October 22nd, stating that his voice had been always rather thick, having as a boy suffered from enlarged tonsils. He had within

the last twelve months become hoarse, and was now almost voiceless. Until three or four weeks previously he had been for some months under the care of another practitioner, who had on eleven different occasions removed pieces of growth, and at the last two or three sittings he had informed the patient that there was the merest fragment left. There is not the slightest suggestion that the practitioner stated other than the truth; but it should be mentioned that all this information was not communicated by the patient until after he had been examined and a sketch made of his case (Fig. CLXIX.), when he exclaimed: 'Why, that is just like the drawing made before I was ever operated upon.' Regarding what was just now said as to constitutional treatment in these cases, it may be stated that this patient had contracted primary syphilis six years previously, followed by sore throat and skin eruption, and was, when first seen, suffering from palmar psoriasis. He had, however, received no medical treatment whatever from his former attendant, who told him that the eruption on his skin had no more to do with his throat than would a broken leg. Mr. Durham, who saw the case in consultation with me, aptly retorted: 'But you would think a broken leg had something to do with your throat if you had hurt both with one and the same accident.'

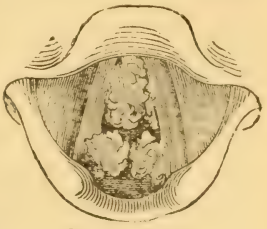


FIG. CLXIX.

CASE 11.—Walter L., a hairdresser, aged 19, first seen on the 3rd of March, 1876, at the Central London Throat and Ear Hospital. He stated that he had always been subject to catarrh, and, having lost his voice during an attack two years previously, had never since recovered it. He had attended for nearly a year at the German Hospital, and only on his last visit had been examined with the laryngoscope. He had then attended another (special) hospital, where, after removal of his uvula, pieces of growth were evulsed from his larynx on four different occasions, at intervals of from seven to ten weeks. The largest piece was that last removed. He stated that his voice was now worse than before any operation at all, but that lately his breathing had become laboured. He gave as his reason for discontinuing attendance at this last institution, that he did not see what was the use of these operations if the tumours grew larger at each interval. Laryngoscopic examination showed two pink lobulated and symmetrical growths on the vocal cords at their anterior insertion (Fig. CLXX.). There was great thickening and irritability of the pharynx; the larynx was also extremely congested, and it was difficult to make even an ordinary examination. Although, therefore, this case is brought forward to show the strong tendency to fresh growth, even while under treatment, the fact that any growth at all had been removed reflects the greatest credit on the skill of the practitioner under whose care this patient had been.

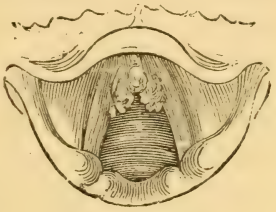


FIG. CLXX.

It is worthy of remark that where there is a tendency to fresh growth in another part of the larynx, or to recurrence in the original situation of the first formation, and repetition of operative procedures is made, the intervals between each successive recurrence almost invariably become shorter. This is only what takes place in recurrence of tumours in other parts of the body.

'5. While primary malignant or cancerous growths are of rare occurrence within the larynx itself, benign growths occasionally assume a malignant and even cancerous character by the

irritation produced by attempts at removal.' This remark is the one which, above all others, has met with most opposition. It has, however, received support from [13]Solis Cohen, [14]Tauber, and others, and notably in the history of one of the patients from whom the late [15]Dr. Foulis excised the larynx.

The primary growth was a papilloma, and was removed by Dr. Morell Mackenzie about five years previous to the time that he came under Dr. Foulis's care; the papilloma was followed by the epithelioma, which was intrinsic, and the specimen is preserved in the museum of the Glasgow Royal Infirmary.

This proposition has, in recent times, received the support of Schnitzler, but, on the other hand, it has been met with energetic opposition from [16]Semon, who adopted the plan of collective investigation, with the result that of 8,216 cases of benign papillomata submitted to treatment, an apparent transformation from benign into malignant growths is acknowledged to have been noticed in 32 instances, or 1 in every 257 cases—but only 16 are admitted as certain, which gives 1 in every 513 cases. I cannot agree with the author's conclusions that 'it must be at once admitted that if the operation had any appreciable influence in modifying the nature of the neoplasm, the proportion of cases in which it would be observed would be much greater than this.' Nor can I admit that my suggestion 'would do much to show that Von Bruns' introduction of intra-laryngeal operations for tumours was not the great improvement it has been held to be—but, on the contrary, a very mischievous procedure.' For with regard to the first proposition, a fallacy is likely to occur, and this in two directions: (*a*) because it is quite possible, and even probable, that where cases believed to be benign have afterwards turned out to be malignant, the operators have returned them under the latter heading; and (*b*) because a condition was made that a report must be given of a microscopic investigation; but it should be borne in mind that in a fair majority of supposed benign cases no such examination is made, and not until malignity is suspected is the microscope called in to confirm or dismiss a doubt. As to the second point, I do not understand why the law of possible conversion, by irritation, of a benign into a malignant growth, should not be admitted as readily in the larynx as in other regions of the body; nor why the chance of such an eventuality should be held to be criminal in intra-laryngeal surgery by exception. On the whole, while I am prepared to admit that my experience, which was not derived solely, or indeed mainly, from my own practice, may have been exceptionally unfortunate, I shall never regret that I brought the question under the notice of the profession.

'6. The instruments most generally now in use are far more dangerous than those formerly employed.' On this point the reader is referred back to page 130 for information as to the instruments which I recommend and employ.

'7, and lastly. The cardinal law, that "an extra-laryngeal method ought never to be adopted unless there be danger to life from suffocation or dysphagia," should be applied with equal force to intra-laryngeal operations; and it is a subject worthy of consideration whether, in many cases, tracheotomy alone might not be more frequently performed—*a*, with a view of placing the patient in safety when dangerous symptoms are present; *b*, in order that the larynx may have complete functional rest; and, *c*, as a preliminary to further treatment, radical or palliative.'

If the truth of the previous propositions has been proved, there is not much necessity for enlarging on this one. It is only necessary once more to impress the importance of a more general study of the laryngoscope, and of its use at an early stage in every case of alteration of voice; of the early treatment of hyperæmia of the larynx, remembering that it is the most general forerunner of growths; of the early and active local application of topical astringent applications to such new formations; of the administration of suitable medicinal remedies when there is evidence or presumption of any constitutional cause or complication; and of the non-instrumental interference with these formations for mere symptoms of inconvenience, or at least the avoidance of unguarded forceps—whether for 'evulsion' or 'crushing'—of scissors, or of knives, having always in view the dangers they may inflict on healthy structures, and the fear that traumatic irritation may only make the disease worse, rather than better.

The following is the course of operative measures we pursue:

Formerly, considerable education of the larynx, combined with the administration of bromides and the sucking of ice, was required in order to overcome reflex sensibility; and, in other circumstances, local anæsthesia, by painting of chloroform and morphia, was a tedious and by no means always an innocuous procedure; but all this is now changed. Having decided to remove a growth, cocaine is first applied by means of a cotton-wool brush to the fauces and to the larynx directed by the mirror. In our experience we find it better to make two or three repeated applications, at intervals of six or eight minutes, of a 5 or, at most, 10 per cent. solution, than to employ those of greater strength, since these last are sometimes attended with toxic symptoms. Once or twice where applications of this nature have not been successful in allaying

reflex irritation, I have with advantage injected a small quantity of cocaine subcutaneously. Local anæsthesia being thus obtained, the patient holds out his tongue with his right hand, and the surgeon, handling the mirror with his left hand, introduces with his right the snare (Fig. LXXXVI. or LXXXVII.), or the laryngeal sponge probang (Fig. LXXXVIII., pp. 131 and 132), until he *sees* that it has passed the epiglottis; he then, remembering the antero-posterior inversion of the laryngeal image (Fig. XXVI., pp. 45 and 46), passes the instrument well *forwards;* this is in the contrary direction to what would appear to the unpractised eye to be indicated by the mirror, and it requires some experience to overcome the tendency to pass it backwards. If anæsthesia is not complete, the larynx closes round the instrument the moment it enters the vestibule, and the surgeon will have to trust to his previously ascertained knowledge of the position of the growth as to whether he passes his snare to right or left, to back or front, of the larynx. In many cases there is considerable spasm, which makes it difficult for the instrument to penetrate beneath the glottis, and some amount of force—or, better still, a little patience—is required. I prefer the latter, since force in the case of a snare of fine wire, especially if the loop is large, may bend the loop on itself, and there is really no occasion for hurry; the glottis is sure to open in a second or two, and then this difficulty is overcome. If a growth is situated anteriorly or on either side, I place a finger of my left hand (having withdrawn the mirror so soon as I am sure the instrument is in the larynx) externally in the corresponding situation, so as to give a *point d'appui*. If the growth is situated posteriorly, the patient may be asked to assist by making the act of swallowing. If a loop is used, it is gradually tightened by traction, and withdrawn after the surgeon feels he has placed it in a favourable position for catching the growth; but if the sponge is employed, it may be rubbed up and down several times with considerable firmness. Personally, I generally charge the sponge with a solution of chloride of zinc or sulphate of copper (Form. 65 or 61), or the cocaine solution may be employed to moisten it, with a view of allaying after-pain. On withdrawal of any endo-laryngeal instrument—no matter what the character—spasm often occurs, though this symptom is less marked in the case of instruments incapable of 'nipping' a cord, a cartilage, or a piece of mucous membrane, and its severity is also modified where cocaine has been previously well applied. A few whiffs of chloroform, which should always be at hand, or a sip or two of

cold water, will usually allay discomfort of this character. It is not well to repeat attempts at removal many times at a single sitting, for the threefold reason that (1) the larynx becomes more sensitive with repeated attempts; (2) spasm is more likely to occur; and (3) there is a risk of setting up inflammation, and possibly œdema. Moreover, the moral effect of repeatedly unsuccessful attempts is not calculated to improve the chances of a further trial. Should a practitioner attempt to remove a growth according to the foregoing instructions—and everyone must have a beginning—he will not be less likely to be successful by the assurance, that if he does not catch the growth, he will not be likely with these guarded instruments to injure any healthy part. I beg to repeat here what I have previously stated, that since the foundation of the Central London Throat and Ear Hospital in March, 1874, neither I nor any of my colleagues, present or past, have ever used an unguarded instrument. But while this is the course of treatment which I personally pursue as the result of a long and extensive experience, supported by that of my colleagues, I am not prepared to deny that brilliant results may be, and are daily, attained by the use of forceps, according to the pattern of Mackenzie, Fauvel, etc. I only think the risk of injury from them is greater than with the snare, and as I have always found the latter in every way efficient, I still continue to employ it almost exclusively.

A few cases have already been recorded in which treatment has been successfully employed on the lines I have indicated, and I now add a few more simply to show that the milder measures are not less efficacious or rapid than the bolder ones adopted by others.

CASE 12.—Mr. G. H., aged 70, first consulted me, June 5, 1879, on account of gradual loss of voice, which had commenced two years previously. The present vocal state was one of almost complete aphonia; no pain was experienced, but great effort was required at every attempt to speak.

The cause of his condition is shown in Fig. CLXXI.

There was a large growth on the edge and upper portion of the anterior two-thirds of the right cord, and a smaller one beneath the same cord at its posterior part.

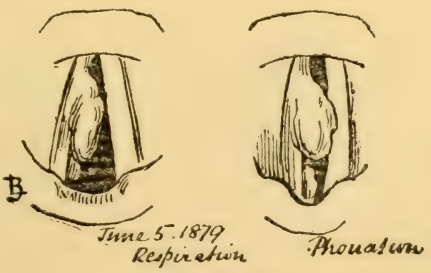


FIG. CLXXI.

After consultation with my late colleague, Llewelyn Thomas, he was placed under treatment; by far the larger portion of the growths was removed by the *snare*, and the voice greatly improved

in tone and freedom ; but on account of his advanced age, the patient was not inclined to persevere to a complete eradication.

Case 13.—J. V., aged 42, a police constable, came under my care at the Central Throat and Ear Hospital, September 13, 1879, on account of loss of voice, which had been gradually increasing since the previous winter, during which he had taken a severe cold after night-duty, and had for some days been completely aphonic.

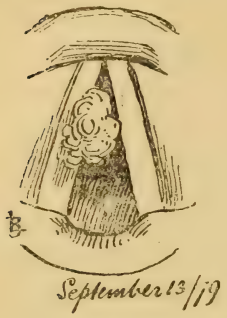


Fig. CLXXII.

The cause of his trouble was a papilloma on his right cord (Fig. CLXXII.), which was removed by the *sponge*, and his voice quite restored. I have often seen this man since, and he has had no recurrence.

Case 14.—Mr. E. C. G. T., aged 52, for many years in the Indian Civil Service, consulted me, in July, 1881, for weakness and loss of voice, which had troubled him for two years. He said it was always worse at the end of the day; but he complained of no other trouble. He spoke with the variable tones characteristic of laryngeal growths ; and with the laryngoscope, the two small neoplasms, depicted in Fig. CLXXIII., were made

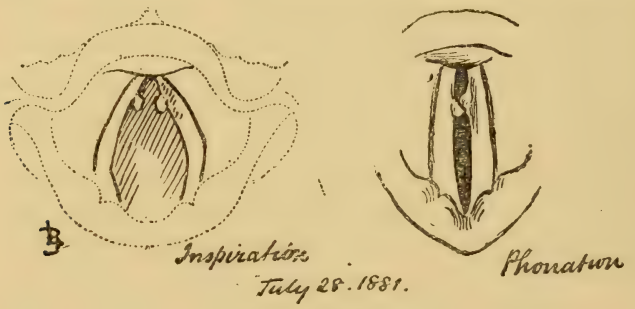


Fig. CLXXIII.

visible. These were easily rubbed off with a *sponge*, and the voice quite restored.

Case 15.—Mr. H., aged 35, of no occupation, consulted me, on November 20, 1883, on account of hoarseness, almost amounting to aphonia, which had steadily increased for two years.

The cause of this condition was a long pendulous growth at the anterior insertion of the cords, and another beneath the left at its posterior portion (Fig. CLXXIV.). After

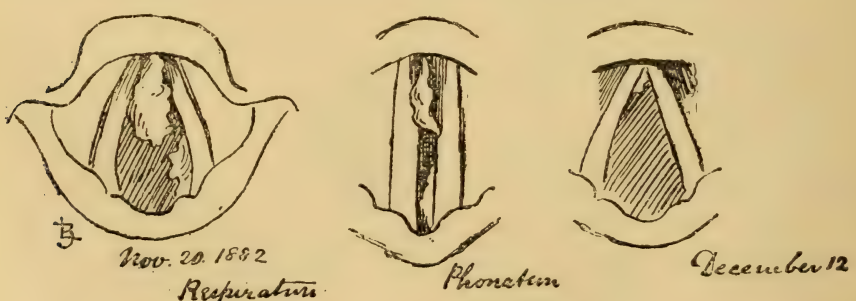


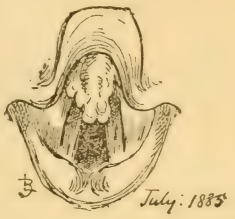
Fig. CLXXIV.

six operations at intervals of two or three months, all was removed by December 12, except the small fragment shown in the first sketch of that date ; but the patient left town.

He returned on August 27, 1886, with a recurrence in this situation nearly to the extent of the original growth. I was so fortunate as to entirely remove it with a *snare* on the first occasion, and the voice was again restored.

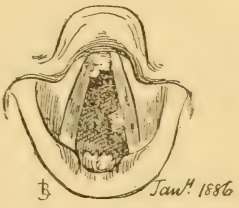
CASE 16.—Frederick M., aged 11. first came under my care in the commencement of July, 1885, on the recommendation of Mr. Brookhouse, of Brockley.

His mother stated that she had noticed a gradual hoarseness for the last eight months. The voice was now reduced to a whisper. There was no other symptom. The laryngoscope showed a large growth hanging down the glottis from its anterior portion. It was difficult to make out its attachments, but it was believed to spring from the right cord (Fig. CLXXV.).



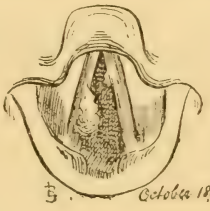
A large piece was removed with the *snare*, and it was then seen that the growth first observed was attached to each cord, and another small sessile one was discovered growing from the edge of the left cord at about its centre. After a series of operations with *snare* and *sponge*, the boy left my care in October with hardly a trace of growth, and with greatly improved voice.

He returned to me on January 26, 1886, with return of hoarseness, and it was then seen (Fig. CLXXVI.) that there was (*a*) a return of the growth on the left cord, (*b*) a subglottic growth *beneath* the anterior insertion, and (*c*) an entirely new growth at the posterior wall, also (very slightly) beneath the level of the cords. Growths were removed on various occasions, and at the end of April he again left my hands with even a better voice than on the former occasion.

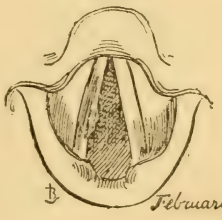


FIGS. CLXXV. AND CLXXVI.

The boy was again brought to me in October, 1886. Again (Fig. CLXXVII.) the growth on the left side had returned, but was now more on the superior surface of the cord than formerly, and there was a fresh one rather larger on the upper surface of the right cord. There was no trace of the growths which had formerly existed at the anterior and posterior commissures. Treatment was resumed, and now—in March—the larynx is clear, with the exception of very slight thickening of the right vocal cord (Fig. CLXXVIII.), and the boy is speaking well. *No other instrument except the snare and Voltolini's Sponge* has been employed, though I have been several times tempted to perform thyrotomy, so discouraging was the frequent recurrence, and so difficult were the operations, on account of the small size and, even under cocaine, very sensitive condition of the larynx.



CASE 17.—Mary E. R., aged 15, engaged in a factory in Bradford, was admitted to the hospital under my care on December 31, 1885, on account of *complete loss of voice*, but with no other symptom but an occasional (aphonic) cough when tired. The vocal deterioration had been gradual, and was of twelve months' duration. Some recent attempts at removal of the growth had been attended with distress of respiration and pain. These had only lasted a fortnight, and were not present on admission.



FIGS. CLXXVII. AND CLXXVIII

The laryngoscopic appearance is indicated in the first of the sketches on the next page (Fig. CLXXIX.).

The growth, which was attached to the right vocal cord, was almost entirely removed by a *snare* at the first attempt on January 2, 1886, and the voice at once restored.

The girl was very talkative, and, moreover, very quarrelsome with the other patients, and passionate; in one of her paroxysms of temper the day after operation, she shouted herself hoarse. On January 4, the larynx generally was somewhat inflamed, and the

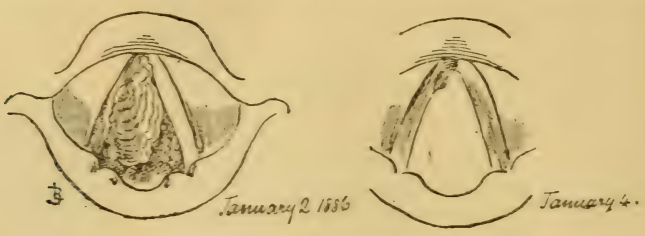


FIG. CLXXIX.

cords considerably so. A slough also was observed at the point of former attachment of the growth, but nothing was left which required removal. She was further suffering from acute inflammation of the pharynx and tonsils. She was ordered the cold coil, aconite internally, and frequent steam inhalations. She was also placed in a separate ward. The inflammation soon subsided, and she left the hospital on February 3 quite cured.

Large adenomatous growths, and some others of the nature of sarcomata, to be considered in the next chapter, may be conveniently and safely removed by Mackenzie's Guarded wheel écraseur (Fig. CLXXX.).

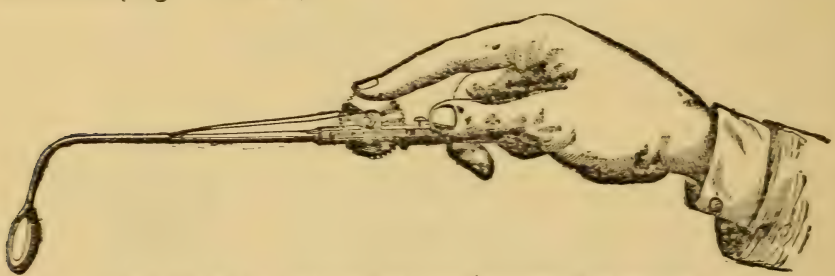


FIG. CLXXX.—GUARDED WHEEL ÉCRASEUR (MACKENZIE).

The question of **thyrotomy**, or division of the external cartilage of the larynx, has not been discussed. It should not be performed except for relief of vital symptoms, nor until an expert has failed to remove the growth by an endo-laryngeal operation, for it is very rarely indeed that the voice is much better after thyrotomy than it was before, and the procedure is not without a certain amount of immediate danger to life. Occasionally, however, as in a case at present under my care, in which there is a ridge-like papilloma attached to the whole length of the vocal cord, no intra-laryngeal treatment would be successful. It occurs in a child aged eight, and, as respiration is seriously embarrassed,

I intend performing thyrotomy. Certain foreign practitioners have not hesitated to divide at one operation two or three rings of the trachea, the cricoid cartilage, the crico-thyroid membrane, the thyroid cartilage, the thyro-hyoid membrane, and even the hyoid bone, for removal of a small and non-malignant growth causing but little annoyance; and all this with apparently no thought of such a consequence as perichondritis or caries. In many cases where there is dyspnœa—the only symptom which appears to warrant interference capable of leading to fatal results —**tracheotomy**, whether as an only step, or as preliminary to other measures, should much more frequently be adopted.

In *benign neoplasms* tracheotomy is sometimes necessary where, the growths being situated on the under-surface of or beneath the vocal cords, attempts at removal set up suffocative spasm. In such a case it is better to perform tracheotomy early and at leisure, after a mild warning, than to have to do so as a matter of urgency. After the operation the growths can not unfrequently be removed from below the glottis through the external tracheal orifice. The operation is also sometimes necessary in a case of multiple congenital papillomata, as a preliminary to thyrotomy or other procedure. [17]Hunter Mackenzie has quite recently recorded a case in which tracheotomy having been performed on a child, aged five years, on account of laryngeal growths, the tube could be permanently removed at the end of a year because the growths had *spontaneously* disappeared. He states that 'it is now about six years since the operation was performed, and during the whole of that time there has been no indication of any tendency to recurrence of the growths. The voice is clear, the cords are healthy in colour and outline, the breathing is normal, and the development of the boy is good.' This case affords a striking example of the advantages of functional rest, and its attainment by tracheotomy.

In performing tracheotomy on account of laryngeal growths in the very young, in whom there is reason to suppose the affection to be congenital, there is a source of danger unnoticed until it was presented to me in my own practice,[18] namely that of a congenital pulmonary atelectasis, in consequence of which the rush of air through the tracheotomy-tube, so much greater in volume than the always feeble current through the narrowed glottis, sets up a pulmonary apoplexy, and an even fatal hæmorrhage. In my little patient, aged three, the lungs were found post mortem to be little larger than those of an infant at birth.

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CHAPTER XXII.

MALIGNANT NEOPLASMS OF THE LARYNX.

(Figs. 88 to 91, PLATE IX. ; Fig. 120, PLATE XIV. ; and PLATE XV.)

GENERAL PATHOLOGY.—Malignant disease attacking the ordinary position in the faucial region—the tonsils—has already been considered, and it has been stated how rarely it is found in the naso-pharynx or posterior pharyngeal wall. Its most common site in the pharynx is at the pharyngo-laryngeal orifice. It may commence at the tonsil or base of the tongue, invade the epiglottis, and travel down the ary-epiglottic fold, thus attacking both larynx and pharynx simultaneously, and thereby affecting equally the special functions of deglutition and of respiration. This frequent and intimate connection of the pharynx and larynx, when the subject of malignant disease, is my reason for having resolved to discuss the subject in its entirety, instead of in two separate chapters.

Carcinoma of the pharyngo-larynx is almost invariably of the nature of epitheliomatous ulceration, and is, in my experience, the most common form in which the disease is manifested in this region. The malady, when so originating, has been denominated by [1]Fauvel *cancer of vicinity* (*voisinage*), a term which well illustrates its invasion of the larynx from the pharynx, and differentiates it from *consecutive*, or secondary cancer. which would rather imply that the disease has originated in a distant part, and has been propagated in the larynx as the result of a general systematic infection. Cancer, when commencing in the pharyngeal wall of the larynx, has been well named by [2]Krishaber, *extrinsic*. The disease in this form has also been observed to invade the larynx from the thyroid gland.

Primary cancer of the larynx is that form of malignant disease which does not commence on the outskirts, but arises truly *within* the framework of the larynx; that is to say, from the ventricle,

from the ventricular bands, from the vocal cords, or from the laryngeal surface of the epiglottis. This form has been termed, also by Krishaber, *intrinsic*.

If the term be limited to carcinoma of this nature, the disease will be found to be much rarer than it is considered even by Fauvel and those authors who have enlarged the limit of primary malignant disease. [3]Butlin's statement that 'intrinsic carcinomas appear to be much more frequent than extrinsic carcinomas' is open to question, and his statistics on this head are misleading; because, rightly enough from his point of view, he limits his consideration to those cases only in which the nature of the disease was confirmed by the microscope. It, however, is hardly necessary to point out that such a test is applied with much more strictness to intra-laryngeal growths—which are otherwise often difficult to diagnose from benign—than to pharyngo-laryngeal carcinoma in which the physical symptoms are of much more certain significance.

The varieties of cancer which attack the larynx are mainly two, viz. (1) epithelioma, or squamous-celled carcinoma, and (2) sarcoma; of these the first kind is the more common. In my last edition I spoke of medullary or encephaloid cancer in the larynx, this variety being recognised by Fauvel, Cohen, and most other authors. This, as well as scirrhus, are also both mentioned in the text-books of Bosworth and Gottstein as varieties of malignant disease to be found in the larynx. It is probable that what was formerly called encephaloid would, in most instances, be now described as a small-celled sarcoma, while so-called schirrus, which must be very rare, would now be represented as a spindle-celled or as an alveolar sarcoma. Beyond this it may be briefly stated that the histological appearances of malignant laryngeal disease, whatever the variety, differ in no essential respect from those of the same forms when manifested elsewhere. Any differences which may exist in the course of cancer when manifested in the throat or in different parts of the throat *may*, in a measure, be due to differences of mother-tissue, but they are in a far greater degree influenced by differences of function. When it attacks a part which is concerned in deglutition, it is more rapidly fatal than when only the vocal or even the respiratory portion of the apparatus is involved. It will be presently shown that it depends on no anatomical differences in the glandular system in the pharynx and larynx.

The Lymphatic System in Relation to Isolation of Cancer in the Larynx.—To quote Fauvel, it has generally been laid down and accepted, 'that as, on the one hand, laryngeal cancer is not

propagated by infection in distant organs, so also cancer which takes its origin at a distance from the vocal organ, and which in time may be generally developed in other regions, always respects the larynx. It may be said, then, that laryngeal cancer confines and localizes itself in the region in which it takes its birth, and that cancerous affection of the immediate vicinity of the organ can alone reach it.' [4]Morell-Mackenzie says on this point: 'I only know of one instance in which cancer has developed secondarily in other parts of the body—the original disease having been in the larynx.' The same view has been put in a somewhat different way by Krishaber, who has laid it down as a general rule that the extrinsic cancers affect the glands at an early period, and that the intrinsic cancers do not affect the glands. Mackenzie supports this view also, by affirming that 'the external condition of the neck seldom affords any evidence as regards (intra) laryngeal cancer.' I am in entire agreement as to the view that laryngeal cancer is never truly secondary in the sense used by Fauvel and Mackenzie. But clinical observation has had the effect of causing me to doubt for some time past the accuracy of the statements of these authors regarding the indisposition of cancer of the larynx to infect adjoining glands or distant organs to anything like the extent with which the doctrine is advanced in the words quoted, and by other authors hardly less dogmatically. And this doubt has been strengthened by the fact that until recently I have not found in works on anatomy any explanation in the arrangement of the lymphatics of the larynx which should satisfactorily account for so anomalous a phenomenon as the isolated existence of cancer when manifested in the larynx. [5]Semon, speaking in 1880 on the differences between cancer commencing in the pharynx (called by him carcinoma of the larynx *per contiguitatem*), and that which commences in the larynx (endo-laryngeal carcinoma), stated by way of explanation, 'that the laryngeal lymphatics are much isolated, whilst the pharyngeal communicate freely with those of the surrounding parts.'

Setting aside the circumstance that the case on which he was speaking was one of endo-laryngeal cancer which manifested enormous glandular infiltration, I am obliged to contravene the accuracy of his anatomical premise, albeit the misconception is a very general one. Indeed, text-book information on the subject is very meagre, and is usually limited to a general statement that the lymphatics of the larynx join the deep glands of the neck. But in the work of the distinguished anatomist, [6]Sappey, full information is afforded as follows:

'**Lymphatics of the Larynx and of the Trachea.**—These vessels are remarkable by their number and their development. They are seen to be especially numerous at the level of the upper orifice of the larynx. They spread themselves with extreme abundance over the mucous membrane of the ary-epiglottic folds. They cover also all the surface of the epiglottis, and every other point of the laryngeal mucous membrane, forming, however, in this situation a network many times smaller; this mesh unites into two or three trunks on each side, which pass along the middle portion of the thyro-hyoid membrane to empty themselves into the group of glands situated to the right and left of the larynx, under the sterno-mastoid muscle (*examine carefully* PLATE XV. *at the end of the book*).

'The mesh which is to be seen on the mucous-membrane of the larynx retains the same character in its course along the whole length of the trachea and bronchi (Fig. CLXXXI.). The numerous small vessels which branch off from them at a right angle are almost lost in the glands which are placed on either side, ladder-wise, in relation to these canals.'

No pictorial illustrations of this arrangement were given in the work from which I have quoted, but this deficiency is amply supplied in the splendid 'Atlas' of the same author, which was only completed in 1885, and from which I have borrowed and adapted the explanatory plate (No. XV.) and the annexed illustration (Fig. CLXXXI.).

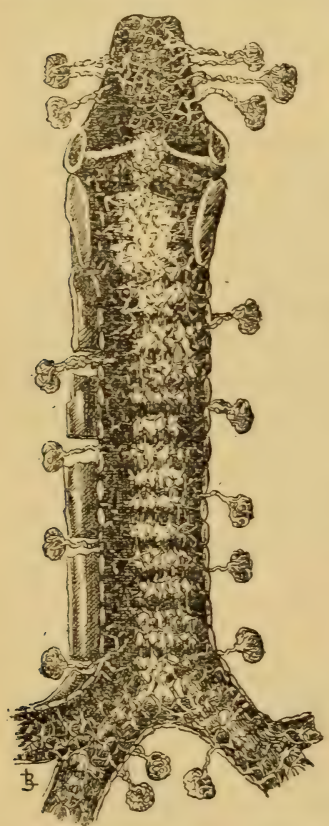


FIG. CLXXXI. — LYMPHATICS OF THE LARYNX AND TRACHEA IN THE ADULT (*after Sappey*).

The following further information is afforded in this last-named volume. We there learn that

'the lymphatics of the air-passages, whether of the superior, middle, or inferior—in other words of (1) the nasal fossæ; (2) the larynx; or (3) the trachea and bronchi—are more developed in the human species than in any other series of the mammalia; and this is especially true of the supply to the larynx. But there is a general tendency for the lymph system to diminish in the subglottic portions of the larynx, and in its course along the trachea. In the superior orifice of the larynx the vessels are multiplied to infinity, and when the injection is well made, a very rich and elegant network may be seen which stretches from the median line towards the ary-epiglottic folds. This mesh ascends also towards the free border of the epiglottis, which it covers completely. In some cases it descends over its anterior part, and is prolonged even to the base of the tongue. *Inferiorly* it stretches over the corresponding wall of the vestibule of the larynx to the ventricular bands, becoming more and more attenuated (*en se raréfiant de plus en plus*).

'*Posteriorly* the network spreads over the ary-epiglottic folds and all the posterior part of the entrance to the larynx, passing from the laryngeal to the pharyngeal mucous membrane. At this point the mucous membrane, which is thin and non-adherent, forms

very numerous folds in its reduplications. Hence the mesh acquires a richness and a tenuity which gives it an appearance without analogy in the economy. This excessive multiplicity of lymphatic radicles accounts for the gravity of lymphatic hypertrophies (*angioleucites*) in the superior half of the larynx, of which so little is still known.'

[This fact is interesting in connection with the clinical importance my colleagues and I have for many years attached to enlargement of the papillæ, and of varix at the base of the tongue and epiglottis.]

'In passing from the superior to the inferior half of the laryngeal mucous membrane, the lymphatic system is seen to become abruptly impoverished, and this is more evident with advance of age.' (See Sappey's 'Atlas,' Plate XLII., Nos. 5, 6, 7, and 8.)

Sappey adds, however, that the *vocal cords can be injected with success as well as every other subglottic portion of the larynx, but not always without a block.* The lymphatic ducts of the laryngeal mucous membrane are divided into two groups—one on the right side, the other on the left. Each of these comprises four or five vessels which converge towards the lateral walls of the laryngeal vestibule, and passing outwards in front of the arytenoid cartilages, along and through the thyro-hyoid membrane, to be discharged into the ganglia situated around the bifurcation of the carotid artery. The very minute radicles which flow from the vocal cords are carried, some from within, to empty themselves into the sub-epiglottic mesh; others, from above and without, to be lost in the network on the internal border of the arytenoid cartilages. The twigs proceeding from the subjacent portion of the laryngeal mucous membrane compass the inferior border of the cricoid cartilage. These unite with those of the trachea, and empty into the very small ganglia which surround the terminal portion of the recurrent nerves.

Regarding the *lymphatics of the trachea and bronchi*, Sappey writes:

'I long believed, and it seemed in effect rational to suppose, that these vessels were more developed in the adult than in the child, and that they were more so in the great divisions of the respiratory ramifications than in the secondary or third divisions. But this opinion was in flagrant opposition to all the results of observation. It is, on the contrary, in the first stages of life that the lymphatic system of the respiratory mucous membrane is seen to be most developed; and it is in the divisions and subdivisions of the windpipe that it attains its greatest importance. Hence diseases of these parts are more frequent and severe during infancy. When one studies the disposition of the lymphatic vessels of the windpipe of an adult, one sees that they are almost wanting at the upper part; but inferiorly, one can inject them at certain points without much difficulty, and thus obtain partial networks of large mesh and of poor appearance, but nevertheless very evident. Their branches empty into the peri-tracheal glands. Lower, at the bifurcation of the bronchi, the meshes are closer, and can be much better penetrated by the injected mercury. At the first bronchial divisions the injection becomes easy. We are thus enabled to recognise that, in the adult, the lymphatic vessels of the air-passages increase both in number and size as they approach the pulmonary lobules, in which they arrive at the perfection of their evolution.'

The connection of these lymphatics with the glands on each side of the trachea has been already described. It is necessary

to add that there is a mass of small glands surrounding the recurrent nerve at the union of the trachea and larynx, which may attain considerable enlargement under morbid influences. Finally, these peri-tracheal glands receive the lymphatic discharges of the œsophagus as well as those of the windpipe.

Granted, therefore, that there is some attenuation of the lymphatics in the subglottic portion of the larynx, it cannot be conceded that there is any *isolation*, nor, indeed, is there any clinical experience to indicate, that advance of age plays any part in conferring immunity from glandular infiltration, which might perhaps be assumed on anatomical grounds alone. The diminished size and number of the lymphatics in the subglottic region may, however, account, to some extent, for the greater rarity of cancer in that situation; but it is noteworthy that in one of the few cases on record of this kind, that of [8]Norton, the glands were affected extensively.

Sappey's researches further prove that—

'In the newly-born infant, in the first year of life, and during the whole period of adolescence, the lymphatic network of the tongue, palate, tonsils, and commencement of the larynx, as figured in Plate XV., is continued without attenuation or modification along the whole length of the respiratory passages, so that one can inject without interruption along the whole of the respiratory part, even to the minute divisions of the bronchi. The system is even more developed in the fœtus at term than in the adult. The contrast is above all remarkable in the trachea . . . . This striking difference between the development of the lymphatic system in the child and in the adult, is a fact which has hitherto escaped the researches of anatomists, and is deserving not only of their attention, but, above all, that of pathologists. It at once suffices to account for the frequency of diphtheritic affections of the first years of life, and for their rarity with advance of age; it explains also the extreme gravity of these affections.'

This last fact is again a direct contradiction to another statement made by Semon on the occasion quoted. 'He believed that the greater virulency of pharyngeal diphtheria, as compared with laryngeal diphtheria, was due to the same cause (isolation of the laryngeal lymphatics).' Clinical experience would generally, I fancy, be as opposed to such a view, as are the anatomical facts set forth by Sappey. On the other hand, there is here afforded an explanation of what I have so often insisted on—the different anatomical characters of all forms of laryngitis in children from what obtains in adults.

It might be added that this circumstance enables us also to understand that the sarcomata or lymphadenomata of the larynx, which are in effect the result of excessive and perverted lymphoid development, are comparatively common in quite young people, although carcinomata, which pathologically may be viewed as deteriorations in growth, are for the most part only seen after middle life.

Consideration of the foregoing statements all go to prove that it is by no means true that that portion of the larynx which is usually attacked by carcinoma is ill-supplied with lymphatics, as is often asserted as an explanation of the so-called 'respect,' but exactly the contrary. We also readily understand, through the knowledge thus obtained and by reference to PLATE XV., why the epiglottis, the ary-epiglottic fold, the hyoid fossa, and the pharyngeal border of the larynx are such favourite spots for malignant manifestations, and why they are much more rare below the level of the ventricular bands and vocal cords (see also p. 473). But even without the aid of the laryngoscope one may be enabled to estimate the probable seat of a cancer, which is not visible on inspection of the back of the mouth or base of the tongue, by enlargement and induration of this thyro-hyoid group of glands. When the regions just named are attacked, I have found, and should expect to find, that the external condition of the neck *generally* affords this evidence of laryngeal cancer. In such cases, also, the so-called cachexia of malignancy is well marked; but this is not by any means so confirmed when the disease is of the nature of a sarcoma, nor is it so uniform in the rarer circumstance of true cancer arising within the cavity of the lower half of the larynx. In this last class of case the lymphatic infiltration is to be sought lower down in the glands at the side of the trachea and bronchi. Two cases, which I shall presently relate, represent a class by no means uncommon, of secondary deposit in the tracheal and bronchial glands and the apices of the lungs; and I believe that if searched for after death, this event will be found to be the rule rather than the exception. It may not always be that the epithelioma is at first visible as an ulceration or actual neoplasm, but if at any time present it must, from what we know of the flow of the lymphatics, be primary; and I suspect that in many cases of so-called cancer of the bronchial glands, employment of the laryngoscope would prove the lymphatic mischief to be secondary to a laryngeal disease. Nevertheless, on account of the deep-seated situation of these tracheal and bronchial glands, and the frequent tendency of their overgrowth to develop inwards rather than outwards, presence of such a condition is not always objectively manifested during life, and thus its probability is overlooked. The direct discharge of the lymphatics of the larynx into these tracheal and bronchial glands, will also account for the almost uniform circumstance of paralysis of the vocal cord corresponding to the side of the larynx which is attacked, when the disease is unilateral,

–and of both cords in the case of more diffuse intra-laryngeal cancer—through gland-pressure on the recurrent nerves. I am, indeed, inclined to think that some of the cases of temporary paralysis which one often sees associated with catarrhal inflammation of the larynx are due to sympathetic enlargement of the tracheal and bronchial glands exerting pressure on the recurrent. That this may be so in cancer is proved in the first of the two following cases. This one also aptly illustrates the fact alluded to by Risdon Bennett, that 'in not a few instances, whilst the intra-thoracic growth is still of limited extent, the symptoms so closely resemble those of aneurism, as to make the diagnosis extremely difficult and uncertain. The more prominent symptoms are indeed in some instances, and for a long time, mainly cardiac.' Each of the cases also illustrates the accuracy of the statement of the same authority, that 'alterations in the external form of the chest are early manifest in some cases, and not till later in others.' These remarks are taken from Sir Risdon Bennett's contribution to Quain's Dictionary, on 'Morbid Growths of the Mediastinum;' and it will be noticed that they apply equally to carcinoma of the larynx with secondary glandular disease at the root of the neck, and to primary intra-thoracic lymphadenoma.

Case 1.—George W., aged 60, a horsekeeper, applied at the Central Throat and Ear Hospital on November 27, 1879, on account of difficulty of breathing, which had begun a month previously, and was becoming gradually worse, with, for three weeks, increasing difficulty in swallowing. There was a history of rheumatic fever eighteen years previously, which was uncomplicated, so far as could be ascertained, by any heart trouble. He acknowledged to have indulged in stimulants to excess, and denied recollection of any strain or violent effort. His *voice* was somewhat hoarse and high-pitched; his *laryngeal respiration* was continuously embarrassed, and slightly stridulous. He suffered with a hoarse, hacking *cough*, which was brought on whenever he attempted to swallow, and was accompanied by much thick white glairy mucus. *Dysphagia* was considerable for solids, but fluids were taken with comparative ease. He complained of occasional *pain* in the præcordial region. His radial *pulse* was 84, the left being more feeble and later than the right. The left hand was cold; the left pupil was slightly dilated. His respirations were 18.

With the *laryngoscope* the posterior part of his larynx was noticed as hyperæmic, but free from ulceration. The *left vocal* cord was paralyzed.

Auscultation gave no evidence of disease in the *right* lung. In the *left* there was slight comparative dulness, with diminished expansion at the apex anteriorly, without any depression. The surface-veins were distended.

The apex of the *heart* was displaced downwards and outwards; valve-sounds normal. A bruit was heard near the cartilage of the first rib, loudest when respiration was arrested.

The dulness below the clavicle, the bruit, the cardiac displacement, the dyspnœa, the laryngeal paralysis, the dysphagia, and the other symptoms—of pulse, etc.—led me to form a diagnosis of aneurism of the aorta to the left of the middle line; and this was the general opinion of my colleagues.

On December 22 ulceration was observed on the posterior surface of the left arytenoid cartilage, which was also swollen.

On the 1st January, 1880, ulceration was noted on the pharyngeal surface of the larynx, and was diagnosed as epitheliomatous. All this time the difficulty in swallowing increased to complete aphagia; and though the patient thought himself better from Chian turpentine, which was at that time being tried, emaciation progressed, and he ultimately died on May 29 of asthenia.

The *autopsy*, made seventeen hours after death by Dr. Dundas Grant, revealed the fact that *there was no aneurism*. The *bruit* had probably been caused by a small cancerous gland (examined microscopically), which was situated in the left supra-clavicular fossa, and had pressed on the junction of the subclavian and axillary vessels. A cancerous gland also pressed on the left recurrent nerve, half-way down the neck.

The *pericardium* contained a few ounces of serum. There was a small superficial deposit on the surface of the upper part of the *right lung*, which was almost cartilaginous in density. The lungs were otherwise healthy.

In the *larynx* there was a thick deposit of epithelial cancer on the posterior surface of both arytenoids, also surrounding the *pharynx* in its lower fourth and at its junction with the œsophagus, where the available passage was reduced to about the calibre of a flattened goose-quill.

Case 2 was that of Major ——, aged 65, sent to me in December, 1886, by Surgeon-General Maclean, C.B., who had not, however, been himself in attendance on the patient. He stated that last May he had suddenly lost his voice completely, when apparently quite well. This symptom improved somewhat, though the function was never completely regained. Two months later—namely, in July—he had attacks of coughing and suffocation in attempting to swallow; he 'felt he should choke if he did not get up the morsel of food.' The difficulty was first experienced at the commencement of the gullet, and was not constant or even frequent; but in the autumn he began to feel an obstruction lower down, and the taking of food was now very difficult. Beyond the attacks of choking he had no dyspnœa; but the voice was very characteristic of nerve-pressure, and the cough was also very expressive of that which we recognise as accompanying cancer. He had great trouble from constantly hawking saliva, and had flying pains of great severity about his throat, ears, and chest. He had lost weight considerably. His respiration was noisy at night.

On examination with the *laryngoscope* (Fig. CLXXXII.), the ventricular bands and also the pharyngeal wall of the larynx were seen to be greatly thickened, so that its margin was ill-defined; and there appeared to be bilateral abductor paralysis; but the left cord was not visible, on account of the swelling of the corresponding ventricular band. From its resemblance to many I have seen (note Fig. CXXVI., p. 293), I at first thought the case was one of perichondritis, and doubtless the cartilages were inflamed; but on examination of the *chest* I found a hard swelling at the sternal end of the clavicle, which I judged to be caused by a growth in the anterior mediastinum. The limit of this tumefaction might be defined by a line drawn from across the right clavicle, at about its inner third, downwards and inwards to the upper border of the third costal cartilage, close to the sternum. There was tubular breathing and dulness—the latter not excessive—over this limited area, not only on the right side, but also on the corresponding portion of the left, which was not swollen. On the left side, however, there was considerable enlargement, without much induration of the glands at the root of the neck. There was tenderness on pressure at the supra-sternal notch, and some (moderate) enlargement in each posterior triangle.

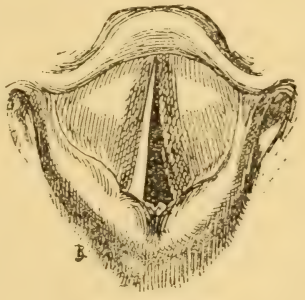


Fig. CLXXXII.

My diagnosis in this case was malignant disease, commencing probably in the larynx,

the voice being first affected—a symptom justly insisted on by Von Ziemssen as of early occurrence, and of great value. Later, the pharyngeal aspect of the cricoid cartilage had been attacked, and hence the choking in swallowing; still later, the intra-thoracic enlargement accounted for the obstruction lower down in the œsophagus.

Subsequent consultations with Dr. Maclean and Dr. Duncan, of Croydon, confirmed this opinion; and the case is rapidly approaching a fatal termination, the patient losing 3 lb. in weight a week, and the aphagia being now almost complete.

I find that [9]Fagge takes exception to the assumption of immunity of concurrent glandular disease, and of cancerous infection of the viscera as a rare occurrence even in *intra-laryngeal* carcinoma, and mentions that in

'a case which he saw in 1879 with Mr. Durham, and which was yet in an early stage, there were already two flat subcutaneous nodules, one near the right clavicle, and the other over the edge of the left sterno-mastoid muscle.'

Still more striking examples of secondary deposits in distant organs of cancer, which commenced within the larynx, have been afforded from time to time. Most of them are collected by Butlin.

[10]Sands reports a case in which the cancer was removed by thyrotomy; the glands of the neck were not affected, nor was there recurrence within the larynx; but after death, which resulted twenty-two months subsequent to the operation, the lumbar glands were enlarged, and the left supra-renal capsule, the left kidney and ureter were diseased. In a second case, that of [11]Desnos, there was secondary deposit in the liver; and a third, reported by [12]Schiffers, strikingly resembled that of G. W., just related as occurring in my own practice. The glands along the jugular vein were extensively affected, and the lungs contained many secondary nodules, varying in size from a pin's head to a nut. Further cases of secondary infiltration have been recorded by [13]Zeissl, in which the glands at the back of the œsophagus were attacked, and of [14]Von Ziemssen, in which the secondary affection was in the cervical glands.

Butlin, from an elaborate analysis of fifty cases, states that 'Krishaber's statement (as to the non-infecting character of *intrinsic laryngeal cancer*) is not far from the truth,' but there are, as has been seen, so many admitted exceptions to this 'law' as to make it really no law at all; the evidence is, indeed, quite as much in favour of, as against glandular infection, and of frequent 'extension of the disease through and beyond the larynx.' This author thinks it 'remarkable that in two of the instances in which dissemination is known to have occurred, the abdominal viscera and not the lungs were affected.' Just noting that I have here reported another case with deposit in the lungs, I would suggest that there is nothing in our knowledge up to the present to justify us in assuming that the abdominal viscera are more frequently attacked than the pulmonary organs; while as to the general infrequency for cancer of the larynx to be propagated elsewhere, may not we look to the character and function of the organ, and say that the air-passages performing a *mechanical* rôle

in the vital economy, as opposed to the digestive duties of the adjoining pharynx and œsophagus, are less likely to convey disease through absorptive processes? May not also the same circumstance account for both the slowness and the extreme malignity of laryngeal cancer? I do not find any circumstance attending cancer in this situation which should favour its more ready propagation through the circulation, nor is the supposition that cancerous material might readily be taken into the lungs directly through the air-passages very probable, in view of the special duties of the cilia of the bronchi. It is far more likely that in cases of secondary deposit in the lungs, the lymphatics represent the infecting channel.

My own experience leads me also to differ from such an authority as Butlin in his statement that sarcomas of the larynx do not affect the glands, for in three out of four cases which have occurred in my own practice, and are recorded in this chapter, the opposite condition obtained. Butlin hesitates to accept three other examples of sarcomas infecting the glands, though two of them occurred to so experienced an observer as Fauvel, and the other to Victor von Bruns. I am therefore unable to agree with his theory, that 'the obstacle to glandular affection in these cases is mechanical, and that the glands are not affected, simply because the elements of the tumour cannot obtain access to them.' He has admitted previously, that 'in the presence of Sappey's plates' (see PLATE XV.), it can scarcely be maintained that the absence of lymphatic vessels is the reason why sarcomas of the larynx do not affect the glands; and it is somewhat difficult to understand why this 'complete obliteration' of the lymphatic vessels, in the case of a sarcoma of the larynx, should be contradicted in the case of sarcoma of the tonsils, the lymphatics of which discharge into the same group of glands as do those of the supra-glottic larynx.

Fauvel was the first to draw attention to the remarkable predominance in liability of the left side of the larynx to be attacked by cancer; but I have observed that the same fact obtains in connection with malignant disease of the tonsils, and even with simple inflammations. In [15] 1876 I pointed out also how much more frequently aural hæmatoma are manifested on the left than the right side, and then suggested that this and similar circumstances might be explained by the more direct flow and greater force of the circulation to the left side of the head and neck.

ETIOLOGY.—Hereditary predisposition appears to play but a small part in the production of cancer in the pharyngo-larynx.

The great predisposition of the male sex (1 to 10) to this disease would rather point to local irritation of occupation, or of habits of smoking and spirit-drinking as factors in its production. Professional exercise, over-use, or abuse of the voice does not appear to act to any great extent as a factor of malignant disease in the larynx, common cause as it is for the development of benign neoplasms in this region.

My own experience leads me to the belief that while simple *hyperæmia*, the result of over-use or abuse of the voice, is the main factor in the formation of *benign* growths, *irritation*, independently of any such functional fault—plus a predisposing condition of the nature of which we are ignorant at present—is the cause of *malignancy*.

All observers agree with the experience of Von Ziemssen and Fauvel as to the preponderating frequency of the ventricle and superior surface of the vocal cords as sites of origin of *intra-laryngeal epithelioma*. The large amount of muciparous glands in the ventricle, and also the ciliated character of its epithelium and of that of the adjoining portion of the vocal cord, offer a probable explanation of this circumstance (see Fig. CXXII., p. 269).

Whether cancer be dependent on diathetic or irritative causes, it is worthy of consideration if, in the female sex, as has been long suggested, the breast and uterus do not serve as outlets for it, and its comparatively frequent occurrence in these organs account for its rarity in the pharyngo-laryngeal region.

Cases have been recorded, one especially by [16] Blanc, of Lyons, in his very complete monograph on 'Primary Cancer of the Larynx,' in which the disease was clearly traceable to traumatic causes—a possibility to which attention has already been drawn as likely to result from the irritation of the larynx caused by attempts at forcible removal of benign growths (p. 455). I shall presently relate a case in which ears of barley were spontaneously assigned as the exciting cause of a sarcoma; but here equally with a carcinoma, and quite irrespective of situation, there must always be, I imagine, a previous change of structure which has predisposed to the malignancy.

Cancer occurs for the most part between the ages of 35 and 65, but sarcomata are comparatively common in early life. The following account of the last-named disease in a child contains several features of interest which justify its relation. For information after the patient ceased to be under my care, I am indebted to Dr. Leslie Ogilvie:

Case 3.—Walter E., aged 9, was admitted to the Central Throat and Ear Hospital under my care, January 4, 1883, suffering from dyspnœa with stridor, but without dysphagia or loss of voice. This condition had only existed for a few weeks, but had rapidly become serious. His past history was good, and with the exception of whooping-cough and measles, his health had been fair. The family history indicated a tuberculous tendency or actual death from phthisis in several members. He was a pale anxious-looking boy. When awake his respiration was fairly easy and tranquil, but during sleep inspiration was very prolonged, harsh and breezy. Sleep was disturbed every few minutes or so by difficulty of aëration. Respiratory rhythm was moreover very unequal.

On examination of the larynx (Fig. CLXXXIII.) an oval swelling was observed on the right pharyngeal border of the larynx, with some œdematous swelling of the ary-epiglottic folds of that side. The cords acted fairly well, but were somewhat imperfectly abducted. Externally a tumour, about the size of a bantam's egg, could be detected; it corresponded to the swelling seen in the mirror. To touch, the enlargement was elastic and almost fluctuating, and in the belief that it was an abscess an incision was made. No pus escaped, but the swelling was much reduced, and his breathing was improved. It, however, rapidly redeveloped, and a piece as large as a walnut was removed by means of the wheel écraseur. Under the microscope the structure was that of a round-celled sarcoma.

Fig. CLXXXIII.

Shortly afterwards, the patient was removed from the hospital, and would have been lost sight of; but through the kindness of Dr. Leslie Ogilvie, under whose care he came in May, 1884, at the Paddington Hospital for children, I am enabled to complete his history. At this date the growth had considerably increased, and as judged externally had a diameter, both vertical and horizontal, of 2½ inches. It was irregular in outline, fairly resistent to touch, and painless. Within the larynx the tumour was seen to have displaced the larynx and to compress the trachea; there were also observed several pendulous growths. Dyspnœa was exceedingly severe, and during night the respiration was of the noisy character that marks bilateral paralysis of abduction. Shortly after admission, tracheotomy was called for urgently on account of spasm. The little patient survived some months, and ultimately died of asthenia on July 16, 1885. Examination of the parts removed on autopsy showed that there was one large tumour 4 inches in length and 3 in diameter, and several smaller ones which had compressed both the trachea and gullet along their whole course in the neck.

Symptoms.—Both subjective and objective evidence of malignant disease will naturally vary according to the part first attacked. When malignant ulceration commences at the base of the tongue, at the epiglottis, in the hyoid fossa, in the pharyngeal aspect of the ary-epiglottic folds, or on the posterior wall of the larynx, difficulty of swallowing will naturally be the first symptom for which relief will be sought. If, on the other hand, the disease commences in the immediate vicinity of the glottis, the voice, and later the respiration, will be first affected, and very little, if any, dysphagia will be experienced at all.

The same may be said with regard to the physical symptoms, which naturally vary not only with the origin, but with the variety, and with the progress of the malady.

Each symptom will, therefore, be described separately, according to the point of origin and the variety of the morbid process.

A. Functional. — **Voice.** — *Pharyngo-laryngeal Epithelioma.*— Articulation and speech are characteristically affected, from diminished mobility of the tongue and epiglottis; but vocal changes are not induced until the disease has reached the larynx. This it does either by pushing the arytenoid cartilage of the affected side out of the way, and so mechanically interfering with its action; by infiltration and ulceration of the intrinsic muscles; by the disease invading the arytenoid or cricoid cartilages; or, lastly, and most usually, by the cancerous mass and accompanying glandular infiltration involving or exerting pressure on the nerve-supply. Whatever the actual cause is, paralysis or impaired mobility of the vocal cord of the affected side, with resulting dysphonia characteristic of such a complication, is an almost invariable symptom of cancer. Actual aphonia is rare.

Intra-laryngeal Epithelioma and Sarcoma.—Here hoarseness is the earliest symptom of the disease, and may have existed a very long time before advice will have been sought. In many cases it occurs suddenly. Complete aphonia often results as the disease advances, especially in the epithelial variety. Nerve-pressure is not so uniform a complication in sarcoma.

Respiration. — *Pharyngo-laryngeal Epithelioma.* — Embarrassment of the respiration is the first symptom manifested after difficulty of swallowing; and shortness of breath may be noticed even before there is any impediment to the passage of food. If, however, only the lingual surface of the epiglottis is diseased, it is quite possible that there may be no alteration of respiration whatever.

Intra-laryngeal Epithelioma and Sarcoma.—Dyspnœa is a symptom which quickly follows impairment of voice: a peculiarity of the embarrassment is that it is experienced only on exertion, and that comparatively very slight movement will cause shortness of breath, and this even though the disease be limited to one side only of the larynx: from this it is evident that the deeper tissues are very early infiltrated and the muscular fibres weakened. In later stages severe paroxysms of dyspnœa are often experienced, and are due either to pressure directly on the trachea or on the recurrent nerve by enlarged glands, to œdema of the glottis, or to stenosis of the glottic orifice. In the two latter events, inspiration is much more impeded than ex-spiration.

Cough is not a prominent symptom of either variety of malignant disease, though the usual sensation of a foreign body is experienced, and gives rise to attempts at its expulsion. True cough will, however, be a marked sign when ulceration attacks

the region of any 'cough-spot,' or in the event of a paroxysm due to compression of trachea or nerve. The sputa should be carefully examined in a suspected case, since it is not at all uncommon for portions of the malignant growth, especially if it be of the epithelial variety, to be expectorated. Whenever this occurs to any extent, there is always temporary amelioration of the vocal and respiratory embarrassment. Traces of blood are often seen in the expectoration; when the cartilages are affected, the mucus becomes fœtid, and attacks of hæmorrhage may be frequent, severe, or even fatal.

Deglutition. — *Pharyngo-laryngeal Epithelioma.* — As already suggested, difficulty of swallowing is naturally the first and the most prominent symptom when the disease commences in this region, and it is astonishing how soon there will be dysphagia, with but very slight physical evidence of the disease.

In one case (No. 5), a patient of Mr. Furley, then of West Malling, and seen in 1871, I was enabled to diagnose carcinoma before there was any loss of tissue or the least obstruction to the passage of the largest bougie, but only a small spot of limited submucous congestion on the pharyngeal surface of the posterior wall of the larynx. The only symptom complained of was that of obstinate dysphagia. Not till a year later was there actual ulceration.

In another (Case 6), occurring in the spring of 1877, in which I had the advantage of a consultation with Mr. Callender, there was the same unique symptom accompanied by emaciation; the only physical evidence was very slight ulceration of the free edges of the epiglottis, without any thickening whatever, though there was some external glandular infiltration.

Had the ulceration been of syphilitic or any other non-malignant nature, the symptoms occasioned thereby would hardly have been noticed. There can, therefore, be little doubt that there is enfeeblement of the constrictor muscles at a very early stage of the disease.

Difficulty of swallowing is early accompanied by **pain**; deglutition of solids becomes impossible, fluids are ejected, and even the saliva cannot be swallowed, and is seen continually running away at the side of the mouth.

Intra-laryngeal Epithelioma and Sarcoma.—In this form dysphagia occurs only as the disease attacks the posterior pharyngeal wall, or mounts towards the epiglottis and its arytenoid connections. It never fails, however, to be present, and in process of time it becomes as distressing as when the disease has primarily attacked the alimentary tract.

Pain.—When malignant disease attacks the larynx, the same acute, lancinating, constant pain is present as characterizes the existence of the same form of disease in other parts; but it is more severe in *extrinsic* or general *intrinsic* manifestations than

in *unilateral* intra-laryngeal cancer. In this last form, and especially when the symptoms are phonatory and respiratory, pain may for a long time be altogether absent. Allusion was made, in describing cancer of the tonsil, to the excruciating pain so often experienced in the ears when the patient attempts even to swallow his saliva, and Von Ziemssen has, with great justice, insisted on the presence of ear-ache as a positive argument in favour of the presence of laryngeal cancer. He 'attributes the pain shooting out to the ear of the affected side to an irradiation of the irritation caused by the neoplasm in the sensitive fibres of the superior laryngeal nerve upon the auricular branch of the pneumogastric.' To this it may be added, that in certain instances irritation of the inferior laryngeal may give origin to the same symptom.

B. PHYSICAL.—*Pharyngo-laryngeal Epithelioma* (Figs. 88, 89, and 90, PLATE IX.) commences with a limited and more or less circumscribed congestion, not differing in appearance from ordinary catarrhal hyperæmia, except in its limit of situation and in the thickening of the submucous tissue: the colour may deepen to quite a purple scarlet before the deposit becomes ulcerated. Ulceration almost always commences at the free edge of the epiglottis, or at the edge of either the glosso-epiglottic or ary-epiglottic ligaments; it quickly descends along the ary-epiglottic folds, always preceded by infiltration, and so it comes to the margin of the larynx, invades that organ, and at the same time displaces it, but the boundary-line between the two passages is seldom lost. This disfigurement during the early stages of the disease is a strong diagnostic point in its differentiation from syphilis, in which deformity takes place as the result of cicatrization. There is, of course, never the least attempt at repair in malignant disorder.

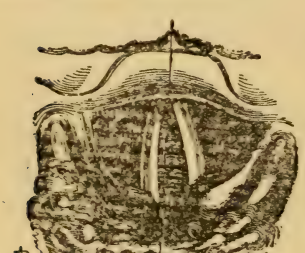


FIG. CLXXXIV.

Epithelioma does not always commence as an infiltration and proceed to ulceration, but may commence as a new growth of the typical external character of a non-ulcerated squamous epithelioma.

Fig. CLXXXIV. represents such a case (No. 7). The disease was seen to commence as a full and irregular outgrowth of bright colour on the right pharyngeal border of the larynx, and so to press on the right arytenoid cartilage, the action of which was paralyzed, and against the cricoid. The disease soon extended right across the back wall of the larynx, concealing its posterior border and greatly diminishing the orifice of the gullet. Later, the cartilages underwent carious degeneration.

The patient was a female, æt. 62, who had suffered from difficulty of swallowing for eight months, followed by shortness of breath on very slight exertion, hoarseness, and pain extending to the ears. There was enlargement of the cervical glands on the right side, the patient steadily lost flesh and strength, and refusing to have tracheotomy performed, died about nine months after the first appearance of the symptoms. This patient was shown at the Pathological Society on February 5, 1878.

Pharyngo-laryngeal sarcoma is rare, and I can recall but two instances.

The first (Case 8) came under my notice March 29, 1881. The patient, Mrs. D., a widow, aged 49, was brought to me by Dr. Stavely King on account of difficulty of swallowing. She complained that the first morsel of solid food always went the wrong way, but there was no difficulty with fluids. She suffered from but slight cough, but was greatly troubled by 'phlegm' of a thick character, which gathered round the upper orifice of the larynx. Three weeks previously she had spat up half a pint of dark blood. Her respiration was very noisy, especially at night. On *laryngoscopic examination* a large nodulated growth, not unlike that illustrated in the previous case, but paler in colour, more prominent, and of apparently firmer consistence, was observed to project from the posterior surface of the cricoid cartilage. The left arytenoid cartilage was also involved, and was entirely hidden from view; both cords were paralyzed. There was decided glandular infiltration of the neck, and I thought the case was one of epithelioma. On her second visit, April 29th, exactly a month after the first, the growth was seen to have increased, and she had lost 5 lb. in weight. I removed a large piece with the guarded wheel écraseur, which, on microscopic examination by Dr. Dundas Grant, proved to be a *mix-celled sarcoma*. The removal was very incomplete, and the benefit but temporary. The growth speedily returned to more than its former dimensions, but a proposal to attempt radical removal was declined by the patient, and I heard of her death nine months later.

The second case, under the care of my colleague, Dundas Grant, was exhibited by me at the Medical Society, on March 28, 1887.

Case 9.—Edwin L., aged 28, farm-labourer, from near Cambridge, applied in the latter end of February at the Central London Throat and Ear Hospital as an out-patient. He complained of soreness and discomfort in the throat, which had commenced last August, and had slowly increased ever since. He attributed it to the irritation caused by the ears of barley getting into his throat during harvesting, he having particularly noticed the annoyance at the time, and endeavoured to overcome it.

He had suffered occasional pain in the last three weeks only, and that not excessive. The painful spot was at the seat of an enlarged gland at the angle of the jaws. *Deglutition*, although uncomfortable, was not materially affected. The phonetic character of his *voice* was good, but his articulation was impaired. He had had no dyspnœa. His weight was 9 st. 12 lb. on the day of operation.

On *examination* it was seen that the left tonsil was enormously enlarged, and protruded far across to the right of the middle line (Fig. CLXXXV.). It was divided into two distinct lobes by a deep sulcus, the anterior one being flap-like and less solid. On passing the finger down the throat, the growth was found to be attached to the epiglottis, and to extend downwards between the palato- and glosso-pharyngei muscles as far as the hyoid fossa. A laryngoscopic view was not possible.

After consultation, Dr. Grant on March 14 removed the growth in the following manner: Solid cocaine being freely rubbed into the surface, he first applied a wire écraseur; but, on account of the firm attachment of the inferior border of the growth, the loop constantly lost its grip, and only small fragments were caught. A large portion of

the remainder was removed with Schutz's new forceps (Fig. CCXXV., p. 626) and Löwenberg's curette, both being instruments usually employed for posterior adenoid growths; and finally the raspatory and finger-nail, till the whole surface was smooth. Cocaine was again applied, and the galvano-cautery freely used. There was but little hæmorrhage.

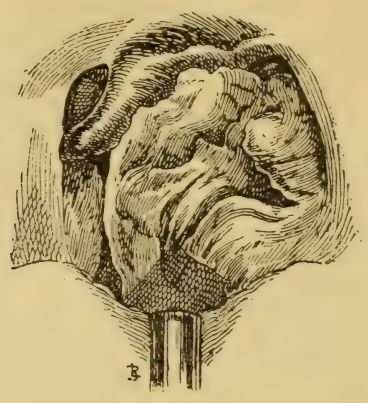


FIG. CLXXXV.—Tonsil before operation.

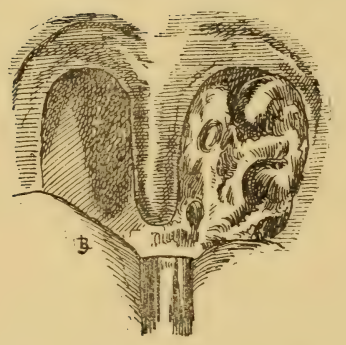


FIG. CLXXXVI.—Fauces 14 days after operation.

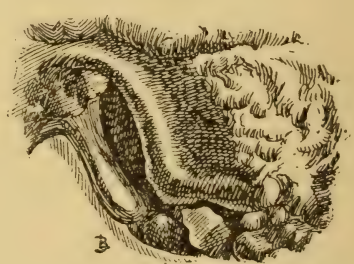


FIG. CLXXXVII.—Laryngoscopic view 14 days after operation.

LYMPHO-SARCOMA OF TONSIL, PHARYNX, AND LARYNX.

New growth was observed in a week, and in fourteen days had recurred to the extent indicated in Fig. CLXXXVI. In a laryngoscopic drawing made also on this date (Fig. CLXXXVII.) it may be seen that the larynx is invaded actually to the extent of the epiglottis; but it does not appear that the left pharyngo-laryngeal wall is involved, although its outline is obscured by the growth projecting across its boundaries. Glandular infiltration is limited to small and moderately hard swelling of one of the thyro-hyoid group.

The nature of the growth was ascertained by microscopical examination of fragments before attempts at more complete removal.

The Secretion of the actual ulcers is not plentiful, unless the true cartilages are attacked. There is always, however, excessive reflex salivation, which proves a symptom of great inconvenience and even of pain.

Intra-laryngeal Epithelioma (Fig. 121, PLATE XIV.) is in its

physical appearances characterized by the presence of a tumour, ill-defined in form, and seldom circumscribed or pedunculated—otherwise it has at first much the appearance of a benign epithelial formation; the surface is formed by irregular nodules standing out from beneath the mucous covering, and when proceeding from the vocal cords, the growth is of a white or pale rose-colour, though when situated in other parts, its hue may be often deepened. Enlarged experience convinces me that this form of cancer frequently commences in the ventricle, though it may appear in the laryngeal mirror to originate from a cord. The *extent* of the disease is often very difficult to determine with the laryngoscope, which affords a necessarily foreshortened view. This is well illustrated by comparison of the figures of the laryngeal image (No. CXC.), and of the removed portion (No. CXCII., p. 495).

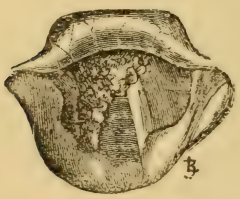
As the disease progresses, the colour always becomes more pronounced, the growth increases in size to even enormous dimensions, and there are various points of ulceration. Still later, the whole mass may have the appearance of one sloughing tumour, from which, if the cartilages have been diseased, there will be abundant purulent secretion.

Laryngeal Sarcoma (Fig. 91, PLATE IX., and Fig. 120, PLATE XIV.).—This form is usually developed in the first instance as a firm, defined and non-pedunculated tumour, or it may appear as a more or less uniform tumefaction of the soft parts, or as general sub-mucous infiltration; it is generally limited in its origin to one side of the larynx.

Its aspect is usually, except when proceeding from the ventricles or vocal cords, smooth and round; but in these latter situations it may assume the lobulated cauliflower appearance of an epithelial growth. In colour it is generally brighter than the epithelial variety; it is of soft consistence, and of very vascular structure; it is therefore liable to early ulceration, and to frequent hæmorrhages. As in the case of epithelioma, these tumours may attain very great size. On this point of the dimensions of a laryngeal sarcoma, my experience is opposed to that of Cohen and Butlin; but the cases I report (Nos. 3, 8, 9, and 10), and many others on record, attest its accuracy.

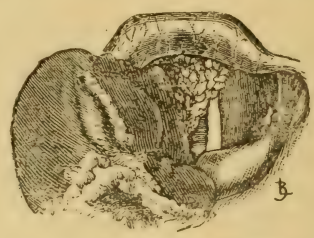
CASE 10.—The patient from whom the specimen which affords the coloured illustration of this form of disease was taken was a female, aged 47, who came under my hospital care in October, 1876. The nature of the malady was diagnosed by means of the laryngoscope fifteen months before death, in January, 1878. The first symptoms were hoarseness, and later almost complete aphonia, then dyspnœa, both constant and with paroxysmal exacerbations, but dysphagia was never severe. Pain, extending to the ears, was an early and constant symptom.

The bright-red colour and smooth lobulated character of the growth shown in the coloured illustration, served to well differentiate the disease from epithelioma, which, when commencing within the larynx, is of a much paler colour and of warty appearance, while, as in the preceding case, when attacking the pharyngo-laryngeal boundary, it commences as an advancing infiltration and ulceration. In sarcoma ulceration is a late manifestation.



October 14, 1876.

FIG. CLXXXVIII.



December 6, 1877.

FIG. CLXXXIX.

These laryngoscopic features are well illustrated in the two drawings (Figs. CLXXXVIII. and CLXXXIX.); the one taken on first seeing the patient, the second more than a year later, and shortly before death (see also Fig. 91, PLATE IX., and Fig. 120, PLATE XIV.).

Microscopic examination gave clear evidence of the character of the growth, which was exhibited by me at the Pathological Society in February, 1878, as a specimen of encephaloid cancer; but with later knowledge, I have no doubt that it was a sarcoma. The post-mortem examination shows that the disease was much more limited to the right side than appeared on laryngoscopic examination, and at the present time I cannot but regret that an attempt was not made to remove it by excision of the affected half of the larynx.

The *most characteristic physical feature* of malignant disease of the larynx, whatever be its variety, is the great **deformity** caused by the new formation. The tumour not only infiltrates and changes diseased portions, but pushes even healthy structures far out of their normal position, so that, as Blanc has well said, 'at a comparatively early epoch of the malady the alterations of the larynx take forms so diverse, that not only does one cancerous larynx not resemble others, but even the same larynx examined at different periods will often present widely different aspects.'

It is this characteristic displacement which may largely account for the severity of the dyspnœa when the glottic lumen does not appear proportionately narrowed, and this symptom may be more frequently traced to mechanical pressure and to nerve-compression than to actual stenosis.

C. MISCELLANEOUS.—**Externally** there is very frequently, but by no means invariably, or in the earlier stages, considerable **glandular infiltration.** In *pharyngo-laryngeal cancer*, this circumstance is of almost constant occurrence, and often proceeds to suppuration; but in *intra-laryngeal* malignant disease, it is sometimes *apparently* absent. Glandular enlargement may then be felt lower down along the windpipe, or at the root of the neck, or there may be dulness at the upper part of the chest. Even where

there is no physical indication of glandular infection during life, the fact is freqently discovered post-mortem ; and the same may be said regarding secondary deposits in other organs. In *sarcoma* of the larynx proper, the lymphatics are said to be not involved, and such was the condition in one of the two cases quoted ; but when a sarcoma commencing in the tonsil extends to the pharynx and invades the larynx by contiguity, there is no immunity of this character. Of such a variety of sarcoma, I have seen three examples. Sometimes the growth itself may be felt by external palpation, especially when the disease has attacked the thyroid and cricoid cartilages. An instance of this circumstance was related at p. 314 in the case of a malignant enchondroma which is there described and delineated (Fig. CXXXII., p. 314). An outbreak of carcinoma through the surface of the integument is rare, but ulceration of enlarged and infiltrated cervical glands occasionally takes place.

Wherever possible, the diagnosis should be completed by the removal and repeated microscopical examination of a portion of the neoplasm.

The **general** symptoms are those common to the malignant cachexia, aggravated by the position of the growth, and interference with vital functions. Occasionally, however, in the early stages of truly intrinsic epithelioma and of primary sarcoma of the larynx, the functions impaired are respiratory rather than nutritive ; as a consequence, there may be but little general emaciation.

In the case just narrated of the patient who was under my care in conjunction with Dr. Brown, of Kentish Town, it was remarked at the autopsy that the body was even more than usually well nourished, as far as the presence of fat was concerned, though the tissues had the characteristic pale and bloodless appearance generally witnessed in the victims of malignant disease.

Prognosis, Course, and Termination.—Malignant disease of the larynx, if unchecked by operation, is universally fatal ; but its course varies considerably, according to its original site and pathological nature. *Small-celled sarcoma*, when occurring within the larynx, grows slowly, and exerts the least amount of constitutional cachexia ; when manifested as an extension from the tonsil the progress is more rapid. *Spindle-celled and alveolar sarcomas* exhibit increased malignancy. *Epithelioma* kills more rapidly than either, when once in a state of active development—that is of new growth or of ulceration ; but it would appear in some instances to lie long dormant. It much earlier affects the general health of the patient than a sarcoma, attacking as it does the vital

mechanisms of respiration and deglutition. It would appear possible, from the result of at least one case (the celebrated one of Bottini), to completely eradicate *sarcoma* by extirpation. In others, comfortable life has been prolonged for some years; but the outlook of such attempts in the case of *epithelioma* is very unfavourable, for however complete may appear the removal, recurrence is invariably sure to take place sooner or later. Attempts at eradication of pharyngo-laryngeal epithelioma are universally ineffectual. This last variety, interfering, as it does, with deglutition and nutrition, is always rapidly fatal in its course.

The direct causes of death are much the same as in malignant disease in those situations of the throat previously considered (p. 249), and life may terminate by marasmus or asthenia, asphyxia, apnœa, or hæmorrhage; or by secondary diseases, as pneumonia, or through perforation of the œsophagus by ulceration.

TREATMENT.—Remedial measures may be divided into—(1) Medical, (2) Surgical, and (3) Hygienic.

As to the first, no drug with which I am acquainted has the least effect on the career of laryngeal malignancy, whatever the circumstances of site or variety, and it is only waste of time to discuss the supposed efficacy of Chian turpentine, mercury, arsenic, sulphide of calcium, iodoform, or ergot. Constipation is a frequent symptom of cancer in the larynx as of other regions, and relief of that state by enemata or otherwise should not be neglected. For the alleviation of pain, local applications of solutions or insufflations of iodoform, morphia, or cocaine are to be advocated; while externally belladonna, chloroform, etc., and continuous heat by the warm coil, are each of more or less service in mitigating agony. Lozenges of cocaine, morphia, etc., are not of much use in laryngeal disease; but sedative inhalations of benzoin, chloroform, conium, etc., give occasional relief to the inflammation (Form. 29, 30, and 34); detergent and antiseptic gargles, especially when used by the Von Troeltsch method (p. 100), tend to diminish the annoyance of excessive saliva, and to sweeten the sense of taste and the odour of the breath. Ear-drops of laudanum and belladonna are of great value in diminishing the constant and wearying ear-ache.

One practical point which should never escape the notice of the surgeon, in the treatment of these cases, is reserved for the conclusion of this section, namely, the possibility that, in spite of apparently decided symptoms, both functional and physical, the disease may be due to the syphilitic dyscrasia; and it must still

further be remembered that the one does not necessarily exclude the other. It is a good rule, therefore, to give antisyphilitic remedies, especially iodide of potassium, or preferably of sodium, at the commencement of the treatment; care being taken, however, lest the error be made of mistaking the improvement, which so often occurs in the first few weeks of such a course, for a prognostication of cure.

2. **Surgical measures** include—(**A**) endo-laryngeal attempts at removal; (**B**) endo-laryngeal cauterizations; (**C**) tracheotomy; (**D**) complete extirpation; and (**E**) partial extirpation or resection.

Consideration of the advisability of operative procedures is always sure to be pressed upon the notice of the surgeon, since both the patient and friends are naturally anxious that the obstruction to deglutition should be removed, and that the life-threatening dyspnœa should be relieved. There can be no objection to operative measures, provided it be well understood on both sides that the relief, though it may be considerable, is in all probability but temporary, and that the inevitable termination will only be postponed.

The degree of danger involved, as well as the amount of benefit to be expected from the various operations just mentioned, will now be considered separately.

A. Possessed of a strong conviction that malignancy may be engendered by repeated removals of a (microscopically) benign growth manifesting rapid recurrence, I cannot counsel **endo-laryngeal** attempts at removal of either a sarcomatous or an epitheliomatous neoplasm, the pathological nature of which has been demonstrated by competent examination of a portion experimentally detached. Looking to the natural history of a *sarcoma*, and the decidedly unsatisfactory nature of results to eradicate it by operation from such easily accessible situations as the tonsil, it is not probable that any procedure of the same nature lower down in the throat would be of permanently good effect; and the same objection obtains with even greater force in the case of *epithelioma*. I concur, therefore, in the general scepticism with which reports of 'cures' resulting from endo-laryngeal operations for malignant disease are to be regarded. An exception must, however, be made in favour of the brilliant success which has rewarded the skill and perseverance of [17]B. Fraenkel in the following case:

The patient, 70 years of age, had a tumour on the right vocal cord of the size of a bean. This was extirpated by the cautery loop. Microscopically it proved to be a carcinoma.

A year later it recurred, and was again extirpated. During the next three years there were three recurrences, with extirpation after each. A carcinomatous gland of the neck was also removed by Professor Madelung. The patient is now 75 years of age, and for two years the larynx has shown no sign of any neoplasm. The voice is clear and loud.

Such a case is indeed a triumph of intra-laryngeal surgery, and proud would any surgeon be if such a result were to fall to his lot. We would all fain hope, but can hardly expect, that this case will ever be otherwise than unique, or at most of very exceptional rarity.

B. The case just reported might be considered as included in the category of an **endo-laryngeal cauterization**, but this term I preferably reserve for applications of the galvano-cautery to malignant ulcerations and infiltrations which do not admit of extirpation. Such a procedure has twice been adopted with advantage by me, once in an epitheliomatous ulcer of the epiglottis, and once in a sarcoma, extending to the same region from the tonsil; but my experience leads me to fear that the benefit of such a measure is but temporary. With regard to its adoption for laryngeal disease at a lower level, I may once again quote the concluding remarks of my paper at the International Congress of 1881:

'While without the galvano-cautery in diseases of the nose, pharynx, mouth, and tongue, I should feel deprived of at least one-half my power to help the conditions for which I use it, I have a strong conviction that were I to employ it to such regions as the larynx below the epiglottis, to the pharynx below the same level, or to the œsophagus, I should introduce into my practice a new and grave element of danger.'

The employment of any other form of caustic, as the traditional nitrate of silver, is futile; while those of a more active character, as chromic acid, or acid nitrate of mercury, are attended by risks out of all proportion to any possible chance of benefit.

C. The operation of **tracheotomy** is attended with very considerable prolongation of life, but it is of course only provisional against dyspnœa, and palliative of the same vitally serious symptom. Fauvel's statistics from his own experience of this operation are very valuable; they show that in the most frequent form of malignant disease—epithelioma—the average duration of life of seven patients on whom *tracheotomy* was performed was *four years;* whereas *six* patients suffering from the same disease, who were *not* submitted to this operation, lived only on an average *twenty-one months*. *Eight tracheotomized* patients, suffering from encephaloid cancer (? sarcoma) of the larynx, lived an average of *three years* and *nine months;* while seven, *not tracheotomized*, survived on an average *three years*. Looking at the fact, that by such an operation the vital symptom of dyspnœa is relieved, and that further measures by galvano-cautery, etc., are rendered more easy

and more safe, these figures may be taken as demonstrating, in the words of Fauvel, 'the *utility*, not to say *the necessity*, *of this operation*.' In one case of intrinsic epithelioma—diagnosed by microscopical examination—under the care of my colleague, Dundas Grant, the patient lived for nearly three years in greatly increased comfort. For some months after the operation she even gained in weight. Such an experience is by no means unique.

An important element in considering the question of any operation on the larynx for malignant disease is the determination, as far as possible, whether we have to deal with an epithelioma—*cancer* in fact—or with a sarcoma. Cancerous growth, if it can be called growth—perhaps it would be better to say the cancerous process—has, within each of its constituent elements, *intrinsic* decay, which commences almost from the date of its birth. A sarcoma, on the other hand, represents an unlimited repetition of cell-growth, which decays by the ordinary process of inflammation; in other words, either from *extrinsic* irritation, or from the new growth increasing beyond the power of the vascular and nervous supply to sustain living. Sarcoma, therefore, while it ranks as a less malignant disease than epithelioma, is the more terrible when it occurs in the air-passages, as it knows no bounds, and much more frequently and more immediately invades the lymphatics.

In a case, therefore, of supposed malignant disease of the larynx, and especially if the respiratory mechanism be impaired, no good purpose is subserved by delay, for supposing even that the diagnosis should haply have been made of a graver malady than the after-history confirms, and the cannula may in time be even dispensed with, not only would no harm have been done, but, on the contrary, there would have been a gain to the patient, if only in the saving of the muscular force wasted absolutely in dyspnœic breathing. This is a consideration but too often neglected, except in the case of paralyses, in which it forms, according to all writers, the chief, and sometimes an exceptional, argument in favour of an early tracheotomy.

In view of the possibility of extension of the disease, tracheotomy, unless made as a preliminary to more radical measures, should be performed as low as possible in the windpipe; for Cohen reports that 'the recurring growth may force its way to the exterior through the wound, or, as he had seen after low tracheotomy, it may rupture an intact crico-thyroid membrane, and split the thyroid cartilage to give exit to its out-growths.' If extirpation is contemplated, the high operation in the second or third rings is preferable.

D. The operation of **complete extirpation of the larynx**, though not for carcinoma, was performed by [18]Patrick Heron Watson, of Edinburgh, so far back as 1866, and was not repeated till 1873, when [19]Billroth adopted the same measure for the disease under present consideration. This patient died from recurrence seven months later. Five cases followed, one of which was again under [20]Watson; one ([21]Heine) terminated with recurrence in six months, and all the others in a few days. Then came the celebrated case of [22]Bottini, who, in 1875, removed the entire larynx on account of a mix-celled sarcoma. The patient was alive ten years after the operation, and pursuing his occupation. Since then the operation has been frequently performed, and there are now fully one hundred recorded cases, the statistics of which have been frequently detailed. No one has taken such pains to investigate the subject with the thoroughness and completeness of [23]Cohen, and I am much indebted to his latest tables for valuable and recent information.

'From the records referred to, and from study of some of the reports in detail, it appears evident that complete laryngectomy can be performed without sacrifice to life, but that every operation places life in peril; and that a large number of the patients succumb within a period so brief, that their early death is attributable to the operation, and to nothing else. Of the deaths reported (to May, 1884, ninety-one in all), twenty-six occurred within the first eight days, and five more within the second eight days—more than one-third of all the patients subjected to laryngectomy having thus succumbed within little more than a fortnight. The most usual cause of death in this period is from pneumonia, and the period of danger from this event does not seem to exceed two weeks, unless the conditions are exceptional. This important fortnight of tribulation safely bridged, the life of the patient may be regarded as tolerably secure up to the fourth month. Then death from recurrence begins to be imminent, and, according to circumstances, will take place within an additional period varying from a few weeks to several months, or to more than a year. Complete laryngectomy involves great risk of death by pneumonia, future respiration through an artificial aperture, temporary nourishment by the stomach-tube, and possibly utter inability to speak without the aid of an artificial substitute for the larynx, adjusted to the tracheal canula.'

I have preferred to quote Cohen's conclusions in place of any of my own, albeit they are identically to the same effect and of long formation, because my well-known views as to undue rashness in endo-laryngeal operations might be held to prejudice my opinions on this question also. When, eight years ago, the late Dr. Foulis, of Glasgow, showed at the Medical Society the patient from whom he had successfully extirpated the whole larynx four months previously, for 'papilloma and spindle-celled sarcoma,' I ventured to express a doubt whether that operation would ever yield beneficial results commensurable with the immediate danger of its performance, the very short extension of life, and the discomfort of an artificial larynx to those who survived long enough to wear one;

and I drew attention to the superiority of the statistics of tracheotomy to those of the radical operation. Dr. Foulis's was the eighteenth complete extirpation, and the second which survived more than nine months, for his patient lived a year and a half, and death ultimately resulted from phthisis.

For the honour of British surgery it is gratifying to be enabled to state that not only was this courageous procedure first adopted by a British surgeon, as already recorded, but that generally the success in this country has been equal to that of Continental, and especially of German operators. Thus [24] Foulis operated on a second patient in April, 1881, who survived *nine months*. In the case of a patient operated on by [25] Whitehead, of Manchester, in May, 1882, that surgeon reports to me that he lost sight of his patient, but that he was well *twelve months* afterwards. [26] Jones, of the same city, had a case in April, 1884, which he informs me survived *nine months;* and [27] Newman, of Glasgow, successfully removed the larynx on February 6, 1886, from a man aged thirty-seven, who in March, 1887, *thirteen months* after, is well, and 'able to follow his occupation.'

On the other hand, the operation has been performed in this country, as on the Continent, somewhat unjustifiably, for cicatricial stenoses and for benign formations, and also under very adverse circumstances—namely, without requisite precaution, in the shape of a proper tampon-canula, against introduction of blood into the trachea, and even without a preliminary tracheotomy. It has also been performed on more than one occasion, as recently by [28] Henry Morris, in response to urgent request of the patient, without regard to any abstract question of favourable statistics. But, however all these points may be viewed, the general results are so discouraging that many surgeons who have performed the operation have resolved never to repeat it, while others have adopted measures less hazardous.

E. Of these less dangerous operations, **partial laryngectomy,** in the form of removing a lateral half, stands in the first rank. The risk of pneumonia is less, exposure of the pneumogastric being confined to only one side instead of both; if the raspatory be used for the removal of soft parts, as in my practice, the nerve need not be exposed at all. The danger of pneumonia in its septicæmic form, as a result of blood entering the lower air-passages, has been still further lessened by introduction of the compressed sponge tampon-canula, which is an immense advance on the indiarubber inflating tampon-canula of Trendelenburg. For this improvement—as also, indeed, for general acceptance of the operation—the profession is indebted to [29] Eugene Hahn, who

had already great success with complete extirpation, and has since recorded several instances of partial removal with equally happy results. There are now recorded some *thirteen or fourteen* cases, and in only *one* instance has there been an *immediately fatal* result. The operation possesses the following additional advantages: deglutition is not impaired, an artificial larynx is not required—nor even, after a few days, a tracheotomy tube—and a very fair and serviceable voice is generally restored.

Recurrence must, in the nature of things, be always anticipated; and we have yet to see what sort of history cases will have in this respect. So far there is reason to expect that the operation may afford average periods of immunity from recurrence even of the more serious forms of malignant disease almost, if not quite, equal to those provided by tracheotomy. It is earnestly to be hoped that care will be taken in the selection of subjects for this operation, as otherwise discouragement will be given to its performance where other circumstances would be favourable.

Partial laryngectomy has been advised for unilateral and intra-laryngeal epithelioma, and in recent non-infiltrating sarcoma. It is useless in pharyngo-laryngeal epithelioma, in which the larynx is invaded from the pharynx, and whenever there is implication of the cervical glands and structures adjoining the larynx. It is always possible, if on division of the thyroid cartilage the disease is seen to have extended beyond the limits suspected by prior examination, for the surgeon to desist from removal, and to be content with having performed a palliative tracheotomy.

This question—whether intra-laryngeal cancer can be best treated by a palliative tracheotomy or by attempts at radical extirpation—is still *sub judice*. To arrive at a fair verdict every case of laryngectomy and thyrotomy should be fully recorded.

A case in my own practice has already been published[30] at a period long prior to the time at which the real issue—that of immunity from recurrence—can be settled, because I believe that the difficulties of the operation, and also its immediate dangers, have been largely exaggerated.

I may just say that the special dangers to which I allude are those of hæmorrhage and of secondary pneumonia. The abridged account of the case which now follows points out in the most practical way the various steps of the operation, and the special precaution I adopted to avoid hæmorrhage—the fear of which has been so great that in one case (of complete extirpation) Langenbeck was obliged to tie forty arteries.

CASE 11.—G. W., aged 61, occupied in a timber-yard, applied at the hospital as an out-patient, on November 1, 1886, on account of hoarseness of voice, and occasional tickling cough, first noticed about two years ago; he had never suffered pain, or anything approaching inconvenience in breathing, except when hurrying to catch a train or omnibus.

The patient was a hale-looking man for his age, 5 feet 6 inches in height, and weighing 166 lb. The laryngoscope showed that while both vocal cords were congested, the left cord was immobile and ulcerated at its posterior portion. There was at that time but little thickening of the left ventricular band, and of the tissues of the left laryngeal boundary of the pharynx, as is seen by reference to Fig. CXC., which was drawn six weeks after his first applying at the hospital. There was neither then, nor indeed at any period, involvement of the cervical glands, nor was there any constitutional symptom pointing to malignity. Anti-syphilitic treatment pursued for six weeks failed to arrest the ulceration, and there was decided diminution in weight; for on December 13 he weighed only 160 lb., a loss of 6 lb. in six weeks. It was therefore decided, after consultation with my colleagues, to attempt removal of the diseased half of the larynx, and the patient being admitted to the hospital December 13th, the operation was performed on the 15th.

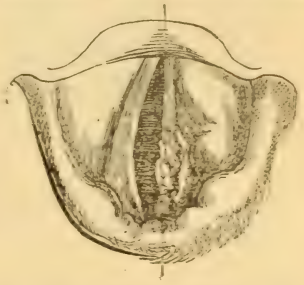


FIG. CXC.—LARYNGOSCOPIC APPEARANCE PRIOR TO OPERATION.

The operation, which lasted an hour and a half in all, may be conveniently divided into four stages:

1. A *high tracheotomy* between the second and third rings, and the introduction of Hahn's tampon-canula, consisting of a tube surrounded by compressed sponge. This was first dipped in a solution of corrosive sublimate (1 in 5,000).

2. An *interval* of *twenty minutes* for expansion of the tampon; anæsthesia being maintained by the administration of chloroform through the tracheal tube.

3. *Thyrotomy.*—The median incision was extended from just above the tracheal opening to the lower margin of the hyoid bone, and all the tissues were carefully divided on a director until the thyroid cartilage was reached. The soft parts over the thyroid and cricoid cartilages were rasped sub-perichondrially, the raspatory being kept so close that the perichondrium was literally peeled away from the cartilage, whilst its relation to the superficial soft parts remained undisturbed. The separation was carried back by this means as far as the median line of the boundary between the larynx and pharynx; no scissors, knife, or other instrument than the raspatory was used. A horizontal incision over the hyoid bone, as recommended by Hahn, was not necessary, the vertical one proving amply sufficient, but part of the hyoid attachment of the thyro hyoid muscle was severed. The much ossified thyroid cartilage was then divided by cutting forceps along its centre; the wings were separated by retractors, and the growth was seen to be confined entirely to the left half of the larynx, which portion it was decided to remove.

4. *Laryngectomy* was effected by (*a*) further careful and thorough separation of the attachments to the pharynx by raspatory, knife-handle, and finger-nail; (*b*) division of the thyro-hyoid membrane, as close as possible to its thyroid attachment; (*c*) division of the left superior horn of the thyroid cartilage at its root by cutting pliers; (*d*) division in the median line of the cricoid cartilage, before and behind, with pliers; (*e*) the divided half of the larynx was then separated from the first ring of the trachea, and a few nicks only were necessary to remove it entire.

The following points regarding the operation are worthy of note. Hæmorrhage, the extent of which is usually described as serious, was, in point of fact, quite trifling; only two small vessels required torsion in the second stage of the operation. Not only were no vessels searched for, as recommended by most writers, but none of any size were

exposed, this happy circumstance being doubtless due to the use of the raspatory in preference to scalpel or scissors, and also to keeping so close to the cartilage. The soft parts were little disturbed in consequence. I am indebted to Mr. Henry Morris for the hint to adopt this procedure, and to it I attribute a very large measure of the success of the operation in its immediate and subsequent circumstances. The slight oozing which ensued after the removal of the diseased portion of the larynx was checked by a light application of the galvano-cautery along the margin of division. This procedure was also adopted for the purpose of destroying any possible fragments of diseased tissue not removed. The left ary-epiglottic fold was divided close to the cartilage of Wrisberg, and the thyro-hyoid membrane close to its thyroid attachment, with the view of impairing as little as possible the action of the epiglottis. The success of this plan was completely shown in the ease with which deglutition was effected three days later. No spray was used; but antiseptic precautions were adopted by the operator, assistants, and nurses first bathing their hands in a solution of the perchloride of mercury (1 in 5,000), and by the cleansing and rinsing of all instruments and sponges in a similar preparation.

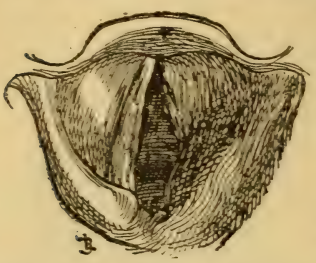


FIG. CXCI.—LARYNGOSCOPIC VIEW, SIXTEEN WEEKS AFTER OPERATION. (April 5, 1887.)

The patient made an excellent recovery, and but with one relapse of a few days, due to carelessness of the nurse. He was fed with a tube for the first three days, but seventy-eight hours after the operation the patient was ordered a mutton chop to eat, according to the treatment of Hahn, who, for obvious reasons, recommends solid food as the first to be given by the mouth. On Christmas Day, the eleventh from the operation, he had turkey and champagne for dinner, and from that date convalescence was uninterrupted. He 'got up' for the first time on the seventeenth day after operation. The tracheal tube was removed on the twentieth day, that is, on January 3rd. His weight was then 148 lb., being a loss of 12 lb. since the operation.

April 5th, that is, the 112th day, wound is healed and the patient speaks with a wonderfully good though rough voice; it is distinctly phonetic, and he thinks it is 'at least as good as before the operation.' His strength and general health have been well maintained, and he looks and feels well. His weight has not changed since January 3rd. The laryngoscopic appearance at this date is represented in Fig. CXCI. The right vocal cord moves freely, but is still somewhat congested; the structures on the left side of the glottis move slightly towards the median line in phonation; the epiglottis acts perfectly, and is not in the least out of position.

Examination of the growth, after removal (Fig. CXCII., and PLATE XIV., Fig. 121), showed it to have sprung from the ventricle, and not from the vocal cord, as had been diagnosed on laryngoscopic examination, in this respect resembling, both in its site and

P.S.: 1889.—The patient survived thirteeen months, and died of a recurrence which necessitated a second tracheotomy.

Examination of the growth, after removal (Fig. CXCII., and PLATE XIV., Fig. 121), showed it to have sprung from the ventricle, and not from the vocal cord, as had been diagnosed on laryngoscopic examination, in this respect resembling, both in its site and in the misconception, several cases reported by other surgeons. The extent of the disease was so far greater than had been suspected prior to operation; this circumstance of the case illustrates the very foreshortened view, with consequently incomplete diagnosis, which may sometimes be obtained by looking into the larynx from above. Generally, the naked-eye evidences were those of epithelioma.

The structure of a superficial unstained shaving (Fig. CXCIII.), removed for diagnostic purposes, presented the appearance of a typical squamous epithelioma, the nests being remarkably abundant. A later-stained and hardened section was made of a portion of the tumour removed much deeper. This was seen, under the microscope, to consist of a

dense connective-tissue stroma, with great increase of nuclei and cellular infiltration, and of a large number of solid columns of an epitheliomatous character, the outermost layer of cells being composed of the columnar variety, enclosing a core of polygonal cells. This condition is shown in Fig. CXCIV. Only one or two distinctly squamous nests were

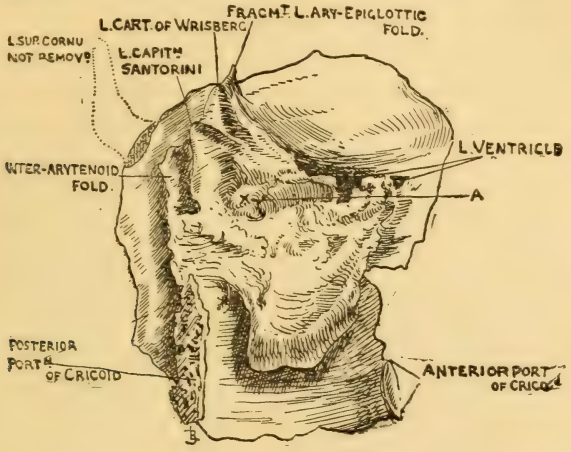


FIG. CXCII.—INTERNAL ASPECT OF REMOVED PORTION (LIFE-SIZE).
A, Spot whence portion was removed for microscopical examination.

observed near the surface. The bulk of the growth was, therefore, an epithelioma of the columnar-celled variety, with squamous characters predominating near the surface. Taking into account the fact that the ventricle of the larynx is lined with columnar epithelium, it is not to be wondered that the growth exhibited these characters. In shavings taken from

FIG. CXCIII.—MICROSCOPICAL APPEARANCE OF SUPERFICIAL SECTION OF GROWTH.

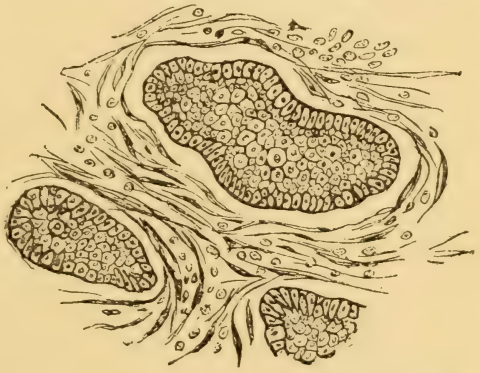


FIG. CXCIV.—MICROSCOPIC APPEARANCE OF GROWTH FROM DEEPER SECTION.

(*From drawings by Mr. G. W. Hill, Pathologist of the Hospital.*)

the extreme edge of the portion of the larynx removed, neither nests nor columns could be detected; and the same satisfactory negative evidence was afforded by repeated microscopic examination of two fragments, removed for that purpose at the time of operation, from the margin of the structures left behind.

Thyrotomy, or division of the thyroid cartilages and removal of the diseased portion, leaving the cartilages intact, has been

thought to be attended with immediate risk fully equal to that of unilateral excision, and to be withal too incomplete to take rank as a legitimate operation. Indeed, the unfavourable summary of its results by [31]Bruns caused this procedure for cancer to be almost abandoned in favour of laryngectomy. But a decided reaction has recently taken place. It is doubtful whether laryngectomy is ever successful in prolonging life for a longer period than a simple tracheotomy, or of giving immunity against recurrence (there are but two or three recorded instances in which patients have lived over two years), except in those cases in which intrinsic malignant disease, not extending to the pharynx, has been recognised before it has attacked the cartilaginous framework or invaded the glands. In such cases [32]Butlin has proposed, and has successfully performed, thyrotomy and erasion of all the soft tissues, including the growth of the affected side. This is probably the radical operation of the immediate future, and attempts at such will, it is hoped, be limited to this measure and to that class of cases for which it is indicated.

Sublingual pharyngotomy, which consists in division of the thyro-hyoid membrane and removal of the growth through the opening thus made, is only applicable to disease of the epiglottis, and is also a procedure of very limited and doubtful value.

3. **Hygienic** and **dietetic** treatment in the case of laryngeal cancer may be comprised in few words. Protection against impurities of the inspired atmosphere by respirators, and residence in pure air, with the avoidance of tobacco, and of ardent spirits, as well as of any habit or occupation likely to induce local irritation, are to be enjoined. So soon as there are symptoms of dysphagia, instead of efforts being made to force the deglutition of solids, an immediate change of diet should be advised, and fluids and semi-solids, or at least artificially masticated and peptonized foods, should be prescribed. In some instances an occasional rest for a few days of the function of deglutition, and limit of the act of swallowing to only sedative and thirst-allaying drinks, with administration of nutriment *per rectum,* is attended by improvement when attempts to swallow are resumed. Feeding by an œsophageal tube, except temporarily after operations, is a somewhat hazardous process, as perforation of the œsophagus may thereby be unintentionally induced. Swallowing of the raw egg *en bloc* is almost always possible, and the recommendation to suck small pieces of ice is a measure that is always gratefully acknowledged by the patient. Applications of cocaine prior to food-taking give relief in some cases, but this is a matter rather medical than hygienic in character.

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CHAPTER XXIII.

NEUROSES OF THE LARYNX.

(Figs. 93 to 100, PLATE X.)

THE neuroses of the larynx may be divided into two classes, viz., those affecting sensation and those affecting muscular movement.

NEUROSES OF SENSATION.

The amount of sensibility, or rather the degree of forbearance of the larynx to the stimulus of an ordinary examination, and to many varieties of foreign visitants, varies greatly within the limits of physiological health.

ANÆSTHESIA.—Diminished sensibility of the laryngeal mucous membrane is likewise a symptom of several diseases, and is present in a large majority of those cases in which there is impairment of motor power. This diminution of sensation is without doubt due to *peripheral* causes in diphtheria, syphilis, and in some cases of long-standing chronic inflammation, and partially in those rare instances in which the patient recovers from attacks of typhus, variola, and erysipelas, which have been accompanied by severe throat complications.

In diphtheria, as we know, there is often superadded to peripheral paralysis, injury to the medulla; and the fact that even where the original disease has been almost confined to the pharynx, parts supplied by the inferior laryngeal nerve have suffered, would indicate that in these cases the pneumogastric is also frequently involved.

In hysteria and bulbar paralysis the anæsthesia is probably *central* in its origin.

I have drawn attention to pharyngeal anæsthesia (p. 207) in the general paralysis of the insane, and this abnormal condition is also to be observed in the larynx. [1]McBride has also alluded to *hemi-anæsthesia* of the larynx, as a result of tumours of the base

of the skull; instances of this condition have been recorded by Fraenkel, Schech, and himself.

Anæsthesia of the larynx has been noticed as being exhibited in a marked degree in cases of cholera; but it is indeed common, in the last hours of life, to many diseases, especially those in which death is by apnœa. Local anæsthesia of the larynx may be induced artificially by various anodyne applications, chief of which is cocaine.

The principal SYMPTOM is want of reaction to the presence of food or other foreign body in the larynx. When the intruder reaches the trachea violent cough is induced, and even more serious effects may result. Allusion has already been made to the fact of the great tolerance with which an hysterical patient will bear laryngoscopic examination; and this paralysis of sensibility accounts also for the difficulty of stimulating the muscles to motor action in cases of functional aphonia, unless a powerful current be applied directly to the laryngeal cavity. [2]Von *Z*iemssen, therefore, has used the electrical current, carefully localized in its application, as a means of diagnosis. This is a more certain method than the laryngeal probe.

In anæsthesia, the epiglottis is generally observed with the **laryngoscope** to stand upright.

The PROGNOSIS of anæsthesia after diphtheria (for the other varieties do not call for further mention) is favourable even in those instances in which there continues impairment of motor action.

TREATMENT.—When the condition is clearly traced to a peripheral cause, faradization is generally all-sufficient; but in some instances the constant current, with one pole applied over the larynx, and the other down the cervical portion of the spine, is indicated. Internally, iron, strychnine, and phosphorus are of use. I have found good results from phosphide of zinc given in doses of one-third of a grain. In those cases where there is paralysis of the epiglottis it may be necessary to feed the patient with an œsophageal tube. Von *Z*iemssen seems to fear the false passage of such a tube into the larynx. If, however, the index-finger of the left hand of the operator be passed far back to the base of the tongue, and the tube be pressed against the posterior wall of the pharynx, and made to pass behind the introduced finger, no difficulty whatever should be experienced.

HYPERÆSTHESIA.—Increased reflex sensibility varies with different individuals quite independently of any abnormal condition, but it is also a common symptom in diseases of the glandular

structure of the larynx and pharynx, as distinguished from those diseases which may attack other portions of the submucosa.

We thus find it in chronic pharyngitis and laryngitis, and in laryngeal phthisis. The peculiar loud, barking cough of nervous females is due to this reflex excitability. It has been suggested by some authors that this hyper-sensitiveness is due to the highly nervous condition, so characteristic and easily comprehended a symptom in patients suffering from chronic pharyngitis, which may be denominated 'speakers' sore throat.' But this cannot be allowed, since in phthisis patients are by no means unduly nervous. Seeing also that the same symptom is very common in the throat inflammations of drunkards, it is much more probable that gastric derangement, associated as it is with all the diseases mentioned, is the cause of the neurosal excitability; and in proof of this it may be remarked that the reflex sensibility often continues after the local catarrhal disease has been cured.

With this condition are often associated many painful sensations, which have been alluded to under the headings of the different diseases.

Paræsthesia of the larynx is almost always to be accounted for by a disorder of the *venous circulation*, either local or general, as has been explained in my remarks on a similar condition of the pharynx (p. 209). To dismiss these cases as hysterical is not only unfair to the patient, but very unsatisfactory. It is perhaps a strong thing to say, but it is almost completely true, that the word 'hysteria' has much to answer for in the fact that it has greatly retarded our knowledge of nervous disorders. But too frequently the diagnosis 'hysterical' does but express an inability to account for symptoms which, in the case of neuroses of the larynx, represent, almost invariably in my experience, an objective condition. The so-called paræsthesia, so common a premonitor of incipient phthisis, represents without doubt the actual sensation to the patient of tissue-changes before the physician has been enabled to detect them. It is different in the case of the sensation which a patient has of a foreign body days or weeks after a particle of food has gone the wrong way, or a small bone or other substance has worried the larynx. This is a true paræsthesia, and it is withal a condition very difficult to cure.

Neuralgia of the larynx is an affection which has received but little attention from laryngologists, and, in the true sense of the term, is rare, since, although patients not unfrequently complain of pain in the larynx as their only symptom, it is seldom that objective causes cannot be found. Of these the most frequent

are general anæmia, and especially gouty or rheumatic exacerbations; patients who suffer from laryngeal neuralgia being almost always subject to similar affections of the fifth and of the sciatic nerves.

Syphilis plays but little part as a cause of the affection in this region. I have seen not a few cases, thought to be true neuralgia in people of advanced age, further investigation of which proved that the pain was due to commencing chondrial or perichondrial changes.

Careful external, in addition to laryngoscopic, examination of the larynx should therefore always be made in those cases in which pain is a prominent manifestation. The noteworthy symptoms in laryngeal neuralgic affections are that the pain is often unilateral, and that a sensation of numbness and cold along the whole of the affected side is experienced, in addition to deep-seated pain more or less distinctly localized in one spot. Is it not possible that the connection of the facial and the glosso-pharyngeal with the pneumogastric at its origin, and of the sympathetic, has more to do with the occurrence of laryngeal neuralgia than any affection of the superior laryngeal nerve itself?

TREATMENT.— Unfortunately, this disease is as troublesome and as intractable to all treatments in the larynx as in other parts of the body. Naturally the great indication is to discover, and if possible remove, the cause. Locally, applications of chloral and camphor, aconite, etc., and hypodermic injections, give relief, and in some instances the inhalation of anodyne vapours is efficacious (Form. 41 and 23). General treatment need not here be enlarged upon, except to say that in my practice exhibition of monobromide of camphor has been attended with good results (Form. 73). In one case a course at Aix-les-Bains was recommended and pursued with great benefit. A relapse occurred, but a second course at the same spa was enjoined, and a complete cure resulted.

NEUROSES OF MOTION (PLATE X.).

Paralysis of motion may be partial or complete, and may represent either defective muscular action (paresis), or complete abeyance of the same (paralysis).

Partial or complete loss of muscular power of individual laryngeal muscles, or groups of muscles, depends on such varied causes, and is capable of such extended analyses, as to be worthy not only of much more attention than I am able, either by space

or ability, to afford, but—much as has already been written—of even something much more complete than has yet appeared.

The division of these affections by Von Ziemssen into paralysis of motion in the *domain of the superior laryngeal nerve*, and of those in the *domain of the inferior or recurrent laryngeal nerve*, has been generally well received. It was the arrangement I made in my former edition, and I see no reason to alter it, as it is a plan which possesses the great advantage of clinical simplicity. In recent times more complete—albeit more complex—classifications have been suggested and adopted.

[3]Gottstein adopts a purely clinical division of 'laryngeal paralyses according to the functional disturbance produced in each variety:'

1. Paresis of the tensors of the vocal cords;
2. Paralysis of the muscles which close the glottis;
3. Paralysis of the muscles which open the glottis or abductors;
4. Paralysis of all the muscles supplied by the recurrent.

This plan, though very practical, is not quite so scientific as that of either Lefferts or Mackenzie.

[4]Lefferts, at the International Congress in 1881, proposed the division of all motor neuroses into five great classes, as follows:

1. Motor paralyses of the larynx, the result of *complete*, usually *acute*, morbid implication of the nerve-centres, or of the main nerve-centres, or of the main nerve-trunks, the lesion being unilateral or bilateral; and the vocal cord or cords assuming the 'cadaveric' position.

2. Motor paralyses of the larynx, the result of *incomplete*, usually *slowly progressive*, lesion of either the nerve-centres, or more commonly, of the nerve-trunks in their course; certain nuclei of the former, or certain fibrils of the latter, alone being implicated, certain muscles alone are paralyzed; the abductor muscles of the glottis being practically the only ones thus affected.

3. Motor paralyses of individual muscles of the larynx, the result of *implication of certain peripheral nerve-twigs*, by local or intra-laryngeal lesion.

4. Motor paralyses of single or groups of laryngeal muscles, the result of simple *myopathic* changes in the said muscles of a degenerative character.

5. Motor paralyses, functional in their nature, the adductor muscles being the ones commonly affected, the abductors very rarely.

The details of this classification were explained with all the accustomed lucidity of its author, and its adoption urged with equally characteristic enthusiasm, and, indeed, there is much to be said in its favour. But [5]Morell-Mackenzie, who speaks with high authority on this subject, has entirely changed his original classification, and has proposed quite a new one which may be called *pathological*, in contradistinction to that of Lefferts which is more essentially *clinical*. Dividing neuroses of motion into the two natural classes, viz., (1) loss of power, or paralysis, and (2) perverted power, or spasm, under the former Mackenzie gives:

1. Paralysis from disease or injury of that portion of the *medulla oblongata* which constitutes the floor of the fourth ventricle ;
2. Paralysis from disease or injury of the *spinal accessory* nerve ;
3. Paralysis from disease or injury of the *pneumogastric* nerve ;
4. Paralysis from disease or injury of the *superior or laryngeal* nerve ;
5. Paralysis from disease or injury of the *recurrent* laryngeal nerve ; and
6. Paralysis of individual muscles or sets of muscles—a class of affections which, though generally of *myopathic* nature, can be most conveniently considered in this subdivision.

The clinical usefulness of this undoubtedly scientific classification is not so great as would at first sight appear. For instance, injury of the *medulla* (1) 'involves paralysis of almost any laryngeal muscles or groups of muscles' without distinction ; while paralysis from a lesion of the *spinal accessory* (2) is unpractical, since, to quote the author under notice, 'the symptoms of uncomplicated disease of the accessory nerve are not at present known.' Lastly, this classification necessitates the treatment of some paralyses under three or four separate headings.

Solis Cohen adheres to the original and simpler plan of Mackenzie and of Von Ziemssen, of considering paralyses of each individual muscle and group of muscles separately.

I have enumerated these different classifications, because they indicate pretty plainly the various aspects from which this vast subject may be viewed ; but I must refer the reader to the works of the original authors for the justification and elaboration of their separate systems. Whichever be adopted, the clinical facts remain the same.

PARALYSIS IN THE DOMAIN OF THE SUPERIOR LARYNGEAL NERVE.

This principally occurs in connection with paralysis of sensation, and implies loss of power in the crico-thyroid, thyro-epiglottic, and ary-epiglottic muscles. It is important to diagnosticate it in all those cases in which the muscles supplied by the recurrent are also attacked, as in such a case there will be disease or pressure on the main nerve-trunk. In other cases it may be peripheral, and is then generally a sequel of diphtheria.

The SYMPTOMS are mainly those of anæsthesia (p. 462) : inaction of the epiglottis, allowing the passage of food into the larynx, viz., when the muscles connected with the epiglottis are attacked ; there is also a hoarse tone of voice and inability to produce high notes, with a sense of fatigue after exercise of function ; these symptoms are due to impairment of tension (an act performed by the crico-thyroid muscle). Frequently associated with this form

of paralysis is a want of co-ordinative power, a condition not, however, peculiar to neuroses of this region only. The general nervous lesion, when exhibited in a mild degree, is often the over-use of the voice, especially during catarrh, impairment of tension being, in point of fact, commonly found in chronic laryngitis. One of many such cases came under my notice in 1878:

It was that of a young lady, sent by Dr. Gowers, who, after some months of choir-teaching and leading, found her singing-voice greatly deteriorated, especially in the production of the higher notes, and in the power of singing for even a few minutes. There was a clear history of forcing of the voice, and continuance of its use during a catarrhal attack. The larynx was, however, perfectly healthy (and it may here be stated that I have never noticed the wavy line in the glottic space depicted by Mackenzie); but there was congestion of the veins in the posterior wall of the pharynx, and slight granulation. An opinion was given that the condition was due to irritation of the superior laryngeal nerve, from its connection with the pharyngeal plexus, thus inducing paresis of the crico-thyroid; and such, it is believed, is the cause in all cases of paralysis of the superior laryngeal, in which there is not corresponding enervation of the muscles supplied by the inferior.

Such cases might be multiplied almost *ad infinitum*. They are of daily occurrence. I am aware that paralysis of the crico-thyroid alone is of extreme rarity, and likewise that this muscle probably receives nervous supply from the inferior, as well as the superior laryngeal nerve; but I have no doubt that the crico-thyroid is the main, if not the only tensor, of the vocal cords; and the association of want of tension, evidenced by inability to take high notes, and of chronic pharyngitis is of too frequent occurrence to allow the opinion that it is accidental.

TREATMENT.—This should be carried out on the lines laid down in the remarks pertaining to diphtheritic paralysis (p. 340) and to chronic pharyngitis (p. 183). When occurring in connection with the latter disease, faradization is of little service, unless the pharyngeal inflammation has been first subdued. To render any cure permanent, careful examination should be made for the particular vocal defect which originated the attack, and a course of teaching enjoined which should lead to its correction.

PARALYSIS IN THE DOMAIN OF THE INFERIOR OR RECURRENT LARYNGEAL NERVE.

Under this head will be considered impairment of motion of all the muscles supplied by this nerve; in other words, of all the intrinsic muscles of the larynx. The special forms are paralysis of adductors, bilateral or unilateral; paralysis of abductors, bilateral or unilateral; and paralysis of the sphincters, otherwise called the laxors, and by some the tensors, of the vocal cords.

Muscular palsies due to implication of this nerve are much more varied, more frequent, and more serious than those of the superior laryngeal, since the number of muscles supplied by it with motor power is so much greater. The causes which may give rise to them may be central (cases of which are rare); or there may be disease of the parent trunk at its point of origin (also rare), or in its course; or of the recurrent, either in its course (the most common cause) or at its peripheral extremities.

Paralyses of laryngeal muscles of central origin are usually dependent on disease of some portion of the medulla oblongata, and are always associated with a like palsy of other muscles of the palate, tongue, head, face, or extremities.

Krause's experiments have satisfactorily demonstrated that the motor cortical centre of the muscles of the pharynx and larynx is situated in the *gyrus præfrontalis*. Its position is almost—if not quite—identical with that of the speech centre; but whereas the latter is unilateral, that of the former is distinctly bilateral. Hence, although in a cortical lesion of the left side only there is *aphasia*, the movements of the larynx are not appreciably affected, on account of the bilateral associations of the two centres.

Cases of traumatic injury of the trunk from gun or sabre wounds have been reported, as also of injury from pressure by various tumours. These latter causes will exert an injurious influence on the recurrent in its course, while catarrh, rheumatism, excessive laryngeal exertion, perichondrial and chondrial changes, ulcerations and new formations in the larynx, may induce peripheral enervation.

It is comparatively seldom that one muscle or one set of muscles only is affected, and the division into paralysis of the muscles affecting the function of voice, and of those affecting that of respiration, although now fallen into disuse, was not without practical value.

As we have seen, paralysis of the crico-thyroid, supplied by the superior laryngeal nerve, almost always involves the muscles acting on the epiglottis, and it is not unfrequently attended with some loss of power of the other muscles which assist in tension of the vocal cords; viz., the internal thyro-arytenoids and the posterior crico-arytenoids. In paralysis of the adductors, impairment of the action of the lateral crico-arytenoids is coupled with that of the arytenoideus; and this last-named muscle is, on post-mortem examination, generally found to be diseased in those cases in which death has been caused by paralysis of the posterior crico-arytenoids. Unilateral paralysis of the adductors is also

seldom of a pure character, there being generally some impairment of abduction and of tension. In this class of diseases the impairment of the to-and-fro motion of the cords varies the shape of the glottic orifice. In some cases one or both cords rest midway between full adduction and complete abduction, and the position then taken is that which may be observed in the normal larynx after death. Von Ziemssen has appropriately called this the 'cadaveric position,' and this term will be here adopted, since it tersely expresses a standard of comparison (Fig. 92, PLATE X.).

The diagnosis of the various palsies by the aid of the laryngoscope is thus easily mastered, though the causes can only be accurately inferred after careful examination with stethoscope, ophthalmoscope, sphygmograph, and other instruments of precision.

The prognosis is in a large number of cases favourable, but should always be cautious, as the detailed account of the principal varieties will indicate. In very many cases, treatment, especially of an electrical character, is strikingly and permanently beneficial.

BILATERAL PARALYSIS OF ADDUCTORS—CRICO-ARYTENOIDEI LATERALES AND ARYTENOIDEUS (Fig. 93, PLATE X.).

This condition is generally due to functional causes, the principal of which is general anæmia. Complete loss of voice is occasionally experienced after recovery from certain diseases which impoverish the blood. The history of many other cases is that of enfeeblement from long nursing of a sick relative, and similar causes, tending to produce at the same time bodily weakness and mental prostration. I cannot agree with Mackenzie, that 'it far less commonly occurs in connection with amenorrhœa than might be supposed from the writings of some authors,' for, according to my experience, amenorrhœa or dysmenorrhœa is the more frequently coexistent uterine condition; and the most favourable periods of life for its occurrence in females are at the commencement and on cessation of menstruation. Allusion has been made in the chapter on laryngeal phthisis to the frequent recurrence of functional aphonia as a premonitor of that disease: in such a case it is a question whether enfeeblement of motor power in the lungs or local anæmia is the principal factor. It is certainly the former in the later stages of laryngeal tuberculosis, to which is added the separation of the arytenoid cartilages by tumefaction. Functional aphonia is much less frequently purely hysterical than is generally considered, and the term 'hysterical

loss of voice' but too frequently represents a want of inclination or ability to find out the true cause. It not uncommonly occurs on the subsidence of a laryngeal catarrh, and it is occasionally produced by sudden fright.

[6] Whitfield Ward, in a very suggestive though brief paper, has usefully drawn attention to the circumstance that 'paralysis of adduction may be subdivided into three forms, namely, a paresis of the arytenoideus, a paresis of the crico-arytenoidei laterales, and lastly, a paresis of the arytenoideus and crico-arytenoidei laterales combined.' I do not quite follow this author when he says that 'the arytenoideus muscle is the principal agent in the production of the affection styled paralysis of adduction;' for it must be remembered that the arytenoideus, when acting independently of the crico-arytenoidei *laterales*, exerts but a partial influence on *adduction;* on the other hand, when acting in concert with the crico-arytenoidei *postici*, its movement is distinctly that of *abduction*.

Symptoms.—The **voice** is simply *lost*, or absent, but involuntary acts, such as **coughing** and **laughing**, are *phonetic;* when the aphonia is the result of catarrhal conditions, however, these sounds are more or less hoarse. In purely hysterical cases there is frequently corresponding functional paralysis of the lips and muscles of **speech**, constituting functional loss of speech as well as of voice. The **respiration** is often somewhat hurried, and if the affection be allowed to remain long untreated, the lungs are liable to suffer. Other functional acts are unimpeded, and there is an entire absence of **pain**.

Laryngoscopic examination shows that on attempted phonation the vocal cords do not approach the median line. There is also generally witnessed some diminution in the power of separation when the patient attempts to take a deep breath. Absence of any new formation, or other mechanical impediment to approximation of the cords, will complete the diagnosis. The mucous membrane is generally pale in colour, though in catarrhal cases its hue may be deepened.

Prognosis.—Recovery from this condition, under suitable treatment, is for the most part speedy, though every now and again one meets with an instance obstinate to all efforts: in relation to life, the most favourable opinion may be given, though the possibility of a tubercular tendency must not be lost sight of.

Treatment.—If stimulating inhalations, general tonics, and change of air fail, faradization should be employed. In many cases, if the current of one pole be applied to the back of the

tongue, and the other over the thyroid region, the voice will be restored; but when this does not avail, there should be no hesitation in introducing the electrode within the larynx. These applications should be continued daily till the voice is permanently restored.

Those hysterical cases are without doubt the more intractable in which a lengthened course of toying with this valuable therapeutic agent has been indulged in; for no better word can be employed to designate the long-continued use of external galvanism applied by the patient or by friends. Allusion has been made to the diminished sensibility of the larynx in purely hysterical cases; but care must be taken, in applying the current for the first time, that the power be not too strong, lest the fright thereby induced serve only to increase the malady intended to be relieved. Of this I have seen several examples.

In many cases strong moral influence is necessary to prevent the voice, once restored, from lapsing back to the whisper, an event which may be considered as the result of habit of the larynx. In some instances in which aphonia occurs at the menopause there is occasionally some functional dysphagia, associated also with neuralgia; in these cases the electric bath and the constant current may be employed in addition to topical remedies.

UNILATERAL PARALYSIS OF ADDUCTORS (Fig. 94, PLATE X.).

'This rare condition may be due to chronic toxæmia, lead, arsenic, diphtheria, etc.; may result from cerebral disease, or may be caused by cold or muscular strain; and is met with after small-pox, in constitutional syphilis, and in phthisis' (Mackenzie).

SYMPTOMS.—Unless the brain be affected, loss of voice or hoarseness is the chief functional sign; but the acts of coughing, sneezing, and laughing are also aphonic or of diminished phonetic power. Difficulty of swallowing is sometimes experienced.

With the **laryngoscope**, the affected cord is seen, on attempted phonation, to be immobile, and to remain in the cadaveric position while the healthy cord acts freely. There is the same diminished power of abduction as in the bilateral paralysis. The only point of value in diagnosis is the possibility that the inaction may be due to perichondrial inflammation, the swelling in this condition being often beneath the vocal cords, and liable, therefore, to pass unnoticed.

PROGNOSIS is favourable when the cause is local.

TREATMENT.—Faradization is of great value in toxæmic cases, and should be accompanied by stimulant inhalations and tonics.

BILATERAL PARALYSIS OF ABDUCTORS—CRICO-ARYTÆNOIDEI POSTICI (Fig. 95, PLATE X.).

This rare condition is the most serious of the individual paralyses of the larynx, since it implies almost complete closure of the portal of 'the breath of life,' and gives rise to stridor, dyspnœa, and even asphyxia.

ETIOLOGY.—Mackenzie considers the causes of the condition to be generally cerebral; but an analysis of nine reported cases collected by Von Ziemssen, of which three were fatal, shows that in one of these there was compression of both recurrent trunks; in the second there was no evidence of even microscopic alteration of either recurrent or pneumogastric, and only in the third was there disease of the root of the pneumogastric and spinal accessory. Of the six cases in which death was not reported, one occurred after typhoid fever, another after pneumonia following erysipelas; and in the four other cases the origin, though doubtful, was as likely as not dependent on catarrhal influences. Analysis of the increased number of cases reported since publication of the foregoing do not alter these facts.

Any new growth, whether it be simple, glandular, hypertrophic, or of an aneurismal or malignant nature, if it press upon both recurrents, may, of course, produce bilateral paralysis. [7]Baumler has narrated one interesting case of bilateral palsy from pericardial exudation.

SYMPTOMS: A. FUNCTIONAL OR SUBJECTIVE.—**Voice** may be but little affected, at least in the moderate functional use necessary for quiet conversation, but may be slightly hoarse if complicated by even slight catarrh. No observations have, so far as I am aware, been made with regard to the singing voice, but one would naturally expect that both tensor power and sustaining quality would be enfeebled.

Respiration.—This is the function which is most seriously impeded; the impairment consisting in *extreme inspiratory stridor*, ex-spiration being normal. This condition is first evidenced on exertion, as in going upstairs, but is later manifested in an extreme degree during sleep; so much is this the case, that one instance has been reported in which it became necessary to remove a patient to a room in the garden of a hospital, as the whole wards were disturbed by his unconscious 'howls.' Naturally the repeated suction of blood into the pulmonary vessels, by chest expansion during closure of the glottis, leads to severe congestion of the lungs; this, if not relieved, eventuates in carbonic acid poisoning.

Cough is not necessarily a prominent symptom; when present, it may be wanting in tone, or when the paralysis is incomplete, it is loud and howling.

B. Physical or Objective.—There need be but little alteration in the colour or surface-texture of the larynx, but the laryngeal mirror at once reveals the condition by the fact that the glottic space is seen to be reduced to a mere slit (not an ellipse, as in paralysis of the thyro-arytenoids); and as a further characteristic, it is seen that this narrowed opening is smaller during the inspiratory than during the ex-spiratory act. This phenomenon is explained by 'excess of external atmospheric pressure over that of the rarefied air within the trachea, while in ex-spiration the glottis returns to its original size. On phonation the linear slit is narrowed in a normal manner, and the vibrations of the vocal cords show nothing abnormal.'

C. Miscellaneous.—**Externally** there may be evidence of glandular or other enlargements, and on auscultation there may be found the signs of an aneurismal or glandular growth in the mediastinum, though the loudness of the inspiration is frequently a great hindrance to accurate stethoscopic diagnosis. There is naturally much constitutional derangement and wasting.

Differential Diagnosis.—The only disease which could be mistaken for this condition is one equally serious and still more rare, *viz.*, cicatricial fixation and adhesion of the arytenoid cartilages from syphilitic ulceration, of which one case has been reported. In spasm of the glottis, the variation in the appearance at different periods will at once clear up the diagnosis.

Prognosis, Course, and Termination.—This affection is, of course, most serious, but it is by no means hopeless, provided it be not due to central lesion or destructive tumours. Of the nine cases previously referred to, three were reported as living long after the introduction of a canula; two either improved or remained stationary, without the necessity for operative interference; and one received distinct benefit from electrical treatment. In those cases in which death occurs, there is always found atrophy and fatty degeneration of the posterior crico-arytenoid muscles.

Treatment.—Even if the origin be central, life may be prolonged and the distress of the patient greatly relieved by the performance of tracheotomy. Mackenzie considers electrical treatment 'scarcely a safe procedure,' but in the only recorded case in which decided improvement took place—that of Von Ziemssen—the benefit was entirely due to the alternate application of the induced and the constant currents.

In the cases of [8]Gerhardt and [9]Nicolas Duranty, the same treatment, although followed by no benefit, was equally unattended by any injurious result.

Since the foregoing was written in 1878, I have had two hospital cases which benefited greatly—one to the extent of a cure—by the long-continued hypodermic injection of strychnia. The treatment was pursued in conjunction with my colleague Dundas Grant.

UNILATERAL PARALYSIS OF AN ABDUCTOR (Figs. 96 and 97, PLATE X.).

This disease is by no means so rare as the preceding. It implies pressure on the recurrent nerve supplying the affected muscle; and from the anatomical situation of the nerve, the left side is much more frequently affected than the right.

ETIOLOGY.—The sources of origin of unilateral abductor paralysis are much the same as those of the bilateral form. Most frequently there is pressure or stretching of the recurrent itself, but the cause may primarily be located in the trunk of the pneumogastric. Aneurism of the arch of the aorta, enlargement of the bronchial glands around the root of the lung or in the course of the nerve, hypertrophy, whether simple or malignant, of the thyroid gland, carcinoma of the anterior wall of the œsophagus with infiltration in the vicinity of the disease, or syphilitic cicatricial narrowing—may all involve the left recurrent. Similar causes may produce enervation on the right side, except that aneurism will be of the innominate or subclavian instead of the aorta; and peculiar to this side is induration of the apex of the lung (p. 383).

A subject that has received much attention of late years is, whether there is or is not a distinct 'proclivity of the abductor fibres of the recurrent laryngeal nerve to become affected sooner than the adductor fibres, or even exclusively, in cases of undoubted central or peripheral injury or diseases of the roots or trunks of the pneumogastric, spinal accessory, or recurrent nerves.' This view has been advanced with great enthusiasm and reiteration by [10]Semon, and several experiments, with a view of confirmation, have been conducted by him in conjunction with [11]Horsley. Into the merits of the discussion I do not intend to enter at any great length critically, more especially since I am inclined to the belief that the clinical importance of the fact, if fact it be, is not so great as is often advanced. But it is only right to say, in the first place, that the view originated with [12]Ottomar Rosenbach, of Breslau, and that the same idea had in a measure

been foreshadowed long previously by Gerhardt, Mackenzie, and others. Observation with the laryngoscope decidedly leads one to the conclusion that in all cases of interference with the recurrent, there is, *apparently at least*, an earlier evidence of paralysis of abduction than of adduction; and it is this circumstance that has probably led Lefferts, Gottstein, McBride, and others to accept Semon's conclusions on, so far as can be gathered, no other than clinical corroboration. But, on the other hand, they have been contradicted with great vigour by [13]Hooper and [14]Frank Donaldson, jun., both of whom have made numerous and most careful experiments in support of their opinions. The investigations of Hooper were conducted in the Physiological Laboratory of Harvard University; those of Donaldson in the Biological Laboratory of the Johns Hopkins University, and were made under the supervision of, or in co-operation with, eminent physiologists connected with these important institutions. Moreover, the dictum was received with by no means universal assent at a recent meeting in Berlin, [15]Krause being especially opposed to it. [16]Cohen also distinctly dissents from Semon's 'sweeping conclusion, and confesses an inability to discriminate between the position of the vocal bands in extreme abduction—their position during forced inspiration, and their position in relaxation (*cadaveric position*).' This is generally the view I had myself taken in discussion of the subject from time to time with my colleagues, especially with Dundas Grant, before these words of Cohen were written. We had also remarked, as we find Cohen has done, that no notice is taken in this connection of the part the superior laryngeal nerve may play in the transaction. It is quite certain that the sphinctor and tensor action of all the muscles so supplied is in a large sense adductive, and this circumstance may account for the appearance of greater loss of the abductive power of the cords in cases of pressure on the recurrent nerve over that of adduction, quite independently of any actual 'proclivity to abductor paralysis.' As Cohen further says: 'It is not known whether the double function of the recurrent nerve is due to innervation by a common centre, or whether distinct centres preside over separate sets of filaments; while the influence which the nucleus of the pneumogastric may exercise upon abduction of the vocal bands as an organic feature of the respiratory act, is a problem yet unsolved.' Cohen's suggestive remarks have received confirmation through the more accurate knowledge recently afforded on the subject of the innervation of the larynx. [17]Mandlestamm has demonstrated that the inter-arytenoid and

the internal thyro-arytenoid muscles are supplied by the superior laryngeal nerve. The inter-arytenoid is also innervated by both recurrents, so that unilateral injury to the nerve will not affect its adductive power of that side. [18]Exner's experiments and observations are, if possible, still more interesting. The principal facts of present application are that while the external thyro-arytenoid muscle is supplied chiefly, if not exclusively, by the inferior or recurrent laryngeal nerve, the internal thyro-arytenoid derives a large share of its innervation from the superior laryngeal nerve. Exner has also demonstrated the existence of a third or median laryngeal nerve in the rabbit and dog, and suggests that in the human subject this nerve probably lies in the pharyngeal and laryngeal plexus; but it is difficult to trace it into the crico-thyroid muscle. This median branch is believed to be of great motor importance. Both Exner and [19]Weinzweig have demonstrated the crossing of the nerves of the larynx, especially of the superior laryngeal, from one side to the other. With every respect, therefore, for the many elaborate and ingenious arguments that have been advanced, we are precluded, in the light afforded by all these opposing considerations, from giving our adhesion to the views of Rosenbach and Semon on this question, or at least from acceptance of them in their entirety.

Symptoms: A. Functional or Objective.—**Voice** is always rough, harsh, impure, and unequal in tone, or distinctly hoarse, but is seldom or never aphonic.

Respiration.—Inspiratory stridor is characteristic of this affection, as of the bilateral form, but the difficulty of breathing is by no means so exaggerated, and may be even unaffected. The slightest catarrhal influences may produce severe exacerbations.

B. Physical or Objective.—There is usually some general congestion of the mucous membrane, especially of the affected vocal cord, which, with the laryngoscope, is seen not to depart from the middle line; or often, there is some paralysis of adduction also, which causes it to assume the cadaveric position. This is especially observed in those cases due to glandular enlargement and to syphilitic deposit.

C. Miscellaneous.—Nothing more need be said under this head than was stated in considering the preceding affection. Pain and disorder of deglutition will be observed, should the disease be malignant and the œsophagus be thereby involved.

Prognosis, Course, and Termination.—A most serious opinion must be given in every case of this nature, since the disease which gives rise to it is so frequently of a fatal character.

It is probable that formerly the prognosis was often unnecessarily grave, but the contrary fault seems in danger of being now committed. Cases do, however, every now and then come under notice, in which the paralysis assumes a chronic and remittent form.

Such a one occurred in my practice in the instance of a lady, aged 53, first seen in August, 1873, who suffered from occasional severe attacks of hoarseness and dyspnœa. On laryngoscopic examination, congestion and paralysis in abduction of the left vocal cord was observed. There was also dulness both in front and behind, about the root of the lung. I had the advantage of a consultation with Dr. Quain, and the affection was diagnosed to be due to enlarged bronchial glands pressing on the recurrent nerve. Under treatment by external counter-irritation, and the internal administration of the iodide of iron, the patient greatly improved, and has only had two severe relapses, one having occurred six years after she first came under notice, though there has always been some exacerbation on the occurrence of catarrhal or general debilitating influences.

TREATMENT.—Except the means just alluded to as suitable in scrofulous and simple glandular enlargements, there are no measures likely to be of any real benefit, though tracheotomy may give relief to respiratory distress in those cases in which this symptom is manifested.

PARALYSIS OF THE SPHINCTERS OF THE GLOTTIS—THYRO-ARYT-ÆNOIDEI (Fig. 98, PLATE X.).

It is the fashion now to consider the thyro-arytænoidei as tensors, but in point of fact these muscles have above all other a *sphincter* action of the glottis proper, in which function they are assisted by the muscles which close the vestibule or supra-glottic portion of the larynx. Viewed in this light the thyro-arytenoid muscles may be regarded as either tensors or laxors. Gottstein, although he considers that the thyro-arytænoidei act as tensors, expresses just my view when he says that their function is to give the free edges of the vocal cords the firmness *and* elasticity (in other words tension and relaxation) necessary for phonation. These muscles have been termed *constrictors* of the larynx, and very correctly and appropriately also the *vocal muscles* (p. 18). When they are paralyzed, the lower notes of the voice are impure or lost, a condition which is opposed to that which obtains in the case of paralysis of the tensors proper (crico-thyroid). A carefully recorded case of this nature is contained in the contribution of Whitfield Ward to which I have previously alluded. This author considers the action of the thyro-arytænoideus to be solely that of a laxor of the cord. It is doubtful whether the muscle ever acts unilaterally, or whether one-sided paralysis ever occurs. Paralysis of the internal fibres only leads to loss of falsetto notes.

The **cause** is either functional over-exertion, improper voice-production, or hysteria. There is generally associated inaction of the adductors, and this complication accounts for the fact that when the voice is restored in functional aphonia it often assumes a peculiar high-pitched tone, due to impairment of the external fibres of the thyro-arytenoid muscles. The **laryngoscope** reveals a characteristic elliptical opening on phonation. The vocal cords are not only apparently but actually thinner than when the muscle is in its normal condition. Gottstein also mentions what I have often observed, that in this form of paralysis there is increased approximation of the ventricular bands, even to the extent of contact, and that this condition may be mistaken for inflammatory swelling.

Another paralysis sometimes *associated* with the foregoing is that of the **arytenoideus proprius**, which leads to a double elliptical or hour-glass shape of the glottic space; the central constriction being produced by approximation of the vocal processes at the point of juncture of the fibrous and cartilaginous glottis (Fig. 100, PLATE X.). The **arytenoideus** may be also separately paralyzed (Fig. 99, PLATE X.). Both these conditions, especially the last, may be seen in acute catarrh; and it is a question whether these and some other temporary paralyses may not be due to inflammation of the small glands which are situated around the terminal branches of the recurrent nerve.

PROGNOSIS is favourable so far as life is concerned, because none of these forms of paralysis exercise influence on respiration, but in long-standing cases the hoarseness may be obstinate.

TREATMENT consists in complete functional rest, faradization, and in the general administration of remedies calculated to reduce the catarrh, and, later, of nervine tonics. On recovery careful vocal instruction will do much to prevent a relapse.

SPASMODIC AFFECTIONS.

The principal spasms of the larynx are those of the tensors, constrictors, and adductors of the vocal cords, of which the latter is by far the more important.

SPASM OF THE TENSORS may be dismissed in a very few words. It has already been alluded to in association with chronic pharyngitis and with motor paralysis. Attention has been chiefly, if it was not primarily, drawn to this affection as a distinct disorder by Mackenzie, who defines it as a disease 'causing the vocal cords to be unduly and irregularly stretched, and consequently giving

rise to a voice which is feeble, jerky, unsteady, and constantly rising to a high key.'

One has only to examine deeper into the symptoms and causes of this affection to feel assured that the want of co-ordination in the laryngeal muscles is of neither neuropathic nor myopathic origin, but is in point of fact the result of improper voice-production, the patient having either not learned how to breathe when speaking, or else having spoken after the lung has ceased to contain enough air to keep the cords in regular vibration. It is thus found amongst the very class of speakers subject to chronic pharyngitis due to 'forcing' of the voice; and, indeed, such pharyngeal disorder is never absent from those labouring under spasm of the tensors. So far from its being very rare, I consider the affection in its milder forms one of almost everyday occurrence.

For further information on treatment, etc., the reader is referred to the remarks on this portion of the subject contained in the chapter which considers pharyngeal diseases (pp. 197 and 223).* It is quite certain that no such case can be cured by any medicines, local or internal, independently of pharyngeal remedies; nor is faradization of the least service, unless it be accompanied by rest to the voice, and, on resumption of its use, of a proper elocutionary method of respiration. On the other hand, if these latter measures be adopted, a cure may with confidence be promised, and electrical treatment may often be altogether dispensed with.

The condition denominated 'Chorea of the Larynx' by Mackenzie and Schech, and 'Vocal Asynergy' by Krishaber, is really of the same nature, due to the same causes, and amenable to the same line of treatment. In as much as it represents fatigue and spasm of one set of muscles through wrong use and over-use of another, this 'psellismus laryngis' bears some analogy to the conditions comprised under the designation of 'writer's cramp.' The term 'chorea laryngis' has also been applied to laryngeal manifestations occurring in the course of a general chorea during the first periods of menstruation and of puberty in the male, but this affection is quite distinct from that under consideration.

SPASM OF THE ADDUCTORS, that of the tensors being dismissed from further consideration, may be better described under the

* Since revising the portion relating to lingual varix, etc., so common a cause of pharyngeal and laryngeal spasm—tenesmus, in fact—I have seen two cases associated with diabetes, a circumstance to be calculated with when forming a prognosis. Dr. Pavy, to whom I sent one of these patients, writes: '*I* also am often led to suspect sugar in the urine, from an injected appearance of the mouth and fauces. Assuming the existence of a vaso-motor paralysis here, the condition may be more extensive, and involve also the vessels of the chylo-poietic viscera, and thus lead to sugar in the urine.'

broader term, **spasm of the glottis**, and implies a spastic disturbance of automatic muscular movements of the larynx, of varying duration, from a few seconds to at most a few minutes. The particular act which is disturbed is that of inspiration, during which there is convulsive adduction of the vocal cords, causing a narrowing of the glottic space at the moment when it should be widest. This is the condition commonly recognised as **laryngismus stridulus**, and is the only one to which the term **false croup** should be applied.

Etiology.—The disease is essentially one of childhood, or rather of infant life, and occurs most frequently between the ages of four months and two years; but it is occasionally seen in children up to the age of seven or eight years. The male sex is more liable, in the proportion of at least two to one. Until quite recently the causes of this affection were but imperfectly understood. It is now agreed, however, that there is—if not an hereditary—a decided family predisposition to this spasmodic affection; that the majority of patients are either the subjects of rachitis or disposed to that condition, the fontanelles being open, and the skull-cap and thorax unusually compressible; that the disease occurs most frequently in cold climates, in cold seasons, and in unfavourable hygienic surroundings, and that reflex irritation from entozoa or from mal-assimilation of food plays also an important part.

In my opinion this last cause is of greater importance than is generally admitted, for, given the other predisposing causes, the presence of even a comparatively small atom of indigestible material will excite to an attack; such, for instance, as the currant from a bun, a raisin or a grape-skin, or a pip-stone of these last-named fruits. It is clear, therefore, that the peripheral irritation of the pneumogastric, either in its laryngeal, pulmonary, or gastric branches, is a frequent factor.

Enlargement of the thymus gland was considered by [21]Kopp to be the principal cause of laryngeal cramp in children, an opinion which did not bear further examination so far as to its being anything like a universal cause; but many irrefragable cases have been reported in which post-mortem examination showed thymic glandular pressure on the recurrent to have been the cause of death. It is here thrown out as a suggestion, the truth of which can only be confirmed or dispelled by further experience, that, in the cases of young girls subject to glottic spasm, there is a predominating predisposition to thyroid congestion, and to either direct or to sympathetic nerve-irritation.

Such a predisponent is somewhat in consonance with that of Hughlings Jackson, that laryngismus is a perversion of the ordinary respiratory rhythm due to medullary supervenosis, and equally applicable to the condition which brings about laryngeal and epileptiform nasal neuroses. This view, as well as every other hitherto advanced, has recently received uncompromising opposition from William Gay, who, in a recent number of *Brain*, proffers an alternative theory that laryngismus is in fact a respiratory convulsion, the point of departure of which is that portion of the centre which presides over the adductors of the vocal cords; and he compares this spasm to other physical expressions of emotion, such as blushing, desire to micturate through fear, etc.; while the frequency of attacks during sleep is explained on the hypothesis that the spinal centres are then less fully controlled, and are rendered more susceptible to reflex or quasi-reflex influences. It need only be added that acceptance of these carefully considered theories by no means dismisses the co-operative importance of many of those peripheral causes which have long been conceded.

There remains to be noted one other factor of probably greater primary importance than any of the foregoing, namely, the presence of naso-pharyngeal glandular hypertrophy; in other words, **adenoid growths** in the vault of the pharynx. These vegetations, by blocking the natural breathway of the nose and causing the patient to always breathe with open mouth, are probably present in the majority of children subject not only to laryngismus, but also to tetany and convulsions, which are both but exaggerated examples of the same disease. They may reasonably be held to account not only for the liability to exacerbations in cold and damp weather, but also for any or all of the reflex symptoms in the track of the pneumogastric nerve.

Mantle has, on the experience of one case, expressed the opinion that a relaxed uvula is a frequent cause of laryngismus, but it is probable that in all cases the paresis of the soft palate, which causes the elongation of the uvula, is always secondary to the presence of adenoid vegetations or enlarged tonsils, for in my own practice I have found that when these growths are removed, the muscular contractility of the soft palate of a young child is usually quickly restored.

Spasm of the glottis occurs in adults under two circumstances:—1. In females, chiefly at the age of puberty; 2. From traumatic causes, to which some allusion has been made in the chapter on 'Benign Neoplasms.' This includes also the irritation of certain noxious gases and the false passages of fluid or solid substances. It may further be the result of faulty voice-production or other cause for varix of the vessels at the base of the tongue, and hypertrophy of the lingual tonsil, and may then be represented by a species of tenesmus, similar to what is often observed under similar circumstances in the fauces and pharynx.

Symptoms.—The peculiar symptoms of this disease, which have given rise to the terms child-crowing, laryngismus stridulus, and false croup, are too well known to need detailed description,

and may be found recounted in any work on general medicine. It is only necessary to remind the reader that the suddenness and shortness of the attack, and the absence of signs of inflammation, differentiate this affection from true croup; also, that very slight attacks, especially when occurring during the day, are apt to pass unnoticed. Any child, therefore, whose frame and family history predispose to the complaint should be most carefully watched, if the least disposition be manifested to catch the breath during the excitement of play or of so-called 'passion,' which is often a misconstrued evidence of convulsion. The alarmingly sudden termination of this disease might be often averted were mothers forewarned to observe these slight indications.

TREATMENT.—In the case of children, cod-liver oil, the phosphates of iron and lime, iodide of iron, etc., are indicated for systematic administration. Small does of chloral, or of bromide of potassium, may be given at night, but especial regard must be had to the form of nutriment administered, particularly if the child be brought up by hand. During an attack, the importance of placing the child in the sitting posture, or of bending the body forward, slapping the back, and the administration of hot baths with cold affusions to the head, etc., are all well known. Whether or not the act of dentition be an exciting cause to an attack, lancing of the gums gives undoubted relief even in cases where no tooth appears to be pressing to eruption. Scammony, which is deservedly such a favourite remedy in these spasmodic laryngeal attacks in children, is of general service as an aperient, and of special utility as a vermifuge. Adenoid vegetations are to be sought for in all cases, and when present are to be promptly removed, as described further on, in Chapter XXV.

In young girls, the indications must be to establish the menstrual function, and to treat actively, by local measures, any thyroid congestion or enlargement. In traumatic spasm, tracheotomy is often called for; and this extreme step is sometimes necessary in those troublesome hysterical cases which occasionally come under notice as occurring in females about middle life.

NERVOUS LARYNGEAL COUGH.

This form of laryngeal neurosis has been considered by some authors separately from the spasm of childhood on the one hand, and of females in connection with the occurrence or cessation of menstruation on the other; and also without knowledge, or, at least, recognition of the circumstance, that when the so-called nervous cough is not manifested in such association, there are

almost always, if not universally, other neurosal symptoms. These will be more properly considered under the head of reflex epileptiform neuroses.

[23]Morell-Mackenzie, who treats of the condition as a distinct affection, employs the term 'to describe a shrill, often, indeed, extremely metallic cough, which, in the entire absence of any laryngeal or pulmonary affection, occurs in paroxysms, and lasts for many hours each day, only ceasing when the patient sleeps at night. The cough has a very peculiar and even startling sound, being often deep and vibrating, or even occasionally resembling the barking of a dog or the quacking of a duck.'

My own impression is, that there is *always* an objective reason for such a condition. Of these, the irritation of enlarged tonsils —of which I have mentioned three instances (p. 252)—is the commonest in children. It may also probably be a reflex manifestation of ovarian irritation in young girls, and in these cases there is almost always congestion or enlargement of the thyroid gland. The condition is aggravated at the menstrual epoch, and relieved on its termination. Dysmenorrhœa is usually present. I have seen one case of nervous laryngeal cough which always occurred in the early days of conception, and came to be regarded as a certain prognostic of pregnancy before other circumstances confirmed it. The symptom disappeared at the period of 'quickening.'

This form of cough is also associated with lingual and pharyngeal varix. Another etiological factor is peripheral irritation of the superior laryngeal nerve, which is induced by changes of weather, particularly cold north-east and east winds, and is characterized by a distinct and constant localization at some one spot of the pharyngo-laryngeal cavity. This area can generally be seen with the mirror to be the subject of limited congestion. Of this I have had two instances in my practice:

One is that of a lady, now about 55, who has applied to me once or twice a year for the last sixteen or seventeen years; another, also a lady, now 45 years old, who is laid up nearly as often, and requires visiting at her own house. She has been under observation for about seven years. Whenever one comes I am sure to be called for by the other, and I can foretell almost with certainty when to expect that my aid will be sought. In neither is there either bronchitis or laryngitis, but there is always slight temporary paresis of the cord of the affected side, which in each case is the right. I have searched for adhesions of the pleura, enlarged glands, or other possible extra-laryngeal cause, but without success. In one thing my patients are agreed, namely, that they 'swear by the brush,' that is, the local applications of chloride of zinc (Form. 65) or other mineral astringent, to the affected part. Combined with this treatment, expectorant pills (Form. 103) and lozenges (Form. 18) aid the temporary cure, which occupies generally from ten days to two or three weeks.

REFLEX EPILEPTIFORM NEUROSES OF THE LARYNX.

SYNONYMS.—Laryngeal vertigo; Laryngeal epilepsy; Complete glottic spasm in adults.

Remarks on the neuroses of the larynx would not be complete without reference to the curious affection variously known under the above names. Attention was first prominently called to the subject by a communication of [24]Lefferts, in 1883, who, giving two cases in his own practice, added, as is his custom, an excellent *résumé* of the subject up to date. The affection had first been described in 1876 by [25]Charcot, and this author had, up to the year [26]1879, observed four cases. [27]Gasquet, [28]Krishaber, and [29]Gray have each recorded a case; and since the article of Lefferts two more have been added, one by [30]McBride, the other by [31]Russell. Still more recently [32]Massei has added three, and [33]Knight two cases. Almost all these authors have taken the opportunity of the publication of their cases to add valuable information on the etiology and character of the malady. The contributions of McBride, Gray, and Knight are specially valuable in this respect. I shall presently give brief notes of three unequivocal instances in my own practice, which brings up the number to nineteen; and I have seen a few others in which the symptoms did not go the length of vertigo or epilepsy, but presented several modified features common to such conditions.

I have not included an interesting example in the practice of [34]Sommerbrodt, of recurrent loss of consciousness attended by convulsions, due to the presence of an intra-laryngeal tumour. That the symptoms, which were without doubt closely allied to those of genuine epilepsy, were caused by the reflex of the polyp, is proved by the fact that they disappeared at once after its removal.

Laryngeal neuroses of the nature of vertigo are not, so far as my reading goes, mentioned in any systematic work on Diseases of the Throat up to the present time, except by way of appendix to McBride's translation of Gottstein; nor is there any remark on the subject by either Brown-Séquard (Epilepsy), or Stephen Mackenzie (Vertigo), in the articles on those diseases in Quain's Dictionary. Seeing, however, as Russell remarks, that attacks of unconsciousness attending a violent cough are not unknown to medical men, it seems not improbable that if the immediate precursors of the attack be carefully noted, this form of laryngeal neurosis may prove to be not so infrequent as has hitherto been thought. In this belief we are corroborated by Knight.

ETIOLOGY.—**Predisposing Causes.**—From an analysis of the cases at present on record, and including my own—nineteen in all—three presented *neurotic predisposition*, viz., 'incomplete history of hereditary neurosis;' 'a sister decidedly neurotic;' and 'a

decidedly nervous constitution,' representing the extent of this factor. In one other the patient 'had been for a considerable time under great mental strain in the direction of enormous financial matters through very troublous times.' In one case the patient's disposition to attacks were increased by 'over-indulgence in *stimulants;* for although not an habitual drunkard, he sometimes drank to excess.' In the first of my cases, the patient's occupation as a wine-merchant doubtless increased his liability; and in the third the same predisposing influence existed. In one of the milder cases, to which I have alluded, over-indulgence in the pleasures of the table—but rather of food than of drink—was acknowledged. I can also recall another instance which occurred to me many years ago, and presented very similar symptoms. The patient, who was a traveller for a firm of whisky distillers, had violent attacks of cough—became very turgid, and often feared suffocation. He only lost his trouble on changing his occupation. As to other predisponents, *gout* or *rheumatism* are mentioned. In only one case is there note of a *syphilitic* history. The primary attack had occurred when the patient was 25; he had married at 22, and his eldest child was of sound constitution.

In some instances a chronic laryngitis, bronchitis, asthma, a catarrhal pneumonia with irritation at the right apex, or other chest affection, had existed for years or months antecedent to the first attack.

As to *sex*, all the cases reported up to now, with but one exception (a widow aged 47), have been males; and as to the age, the youngest is 35, and the oldest 70. The average period of life, in the fifteen cases in which the age is stated, at which the patient came under observation, is rather over 52 years. The average of first manifestation would appear to be from 40 to 45.

Of the **exciting** causes, peripheral irritation of the larynx is almost universally observed. In one case the traumatism of a fish-bone accidentally swallowed was the starting-point. In another, the spasm occurred during a meal. In one instance the first attack followed violent emotion; the second, on sudden noise; and a third, fear of collision when in a steamer. In another, the first attack occurred after a day of great worry and fatigue. In one of my own cases a pinch of snuff resulted, on two separate occasions, in an instantaneous attack. Tobacco smoke would also cause seizure in this patient, and the same circumstance induced it in Krishaber's case.

Symptoms.—Discontinuing analysis of each separate case or

symptom, but generalizing from all, the following may be considered a fair composite picture of the more prominent features of the malady.

As a rule the patient experiences, by way of premonition, a sensation of *burning*, *heat*, *tickling*, or '*squeezing*' of the larynx; while in many there is no such slight warning, in others there is distinct *spasm*. Then comes *invariably a cough*, sometimes in paroxysm, sometimes sharp, short, and dry, and this cough is followed *immediately* by *giddiness*. This giddiness may or may not be followed by absolute *loss of consciousness*. In far the majority of cases it is so, and in a few others there is a distinct *convulsion*. In Charcot's third case 'the patient experienced giddiness, and almost at the same time the fingers of the left hand became flexed, the left arm became stiff in the position of extension, and was raised almost as high as the head, while the whole limb gave three or four convulsive twitches.' In my second case there was occasionally great pain with rigidity from the shoulder, which extended down the inner side of the upper arm and forearm, along the course of the radial nerve to the thumb, and this symptom, accompanied by general tremor, was always induced if I placed a laryngeal mirror in his throat, or a nasal speculum in his nostrils. In no instance is there record of biting of the tongue, or foaming at the mouth; nor is there once recorded a sign of the cry characteristic of epilepsy. But in two cases there was stridor, in one slight, in another 'like the last paroxysm of whooping-cough.' One patient injured himself once in falling, but it is the only instance recorded of such an accident.

Habitual hebetude, mental clouding, confusion, or other symptoms of *cerebral disorder*, is not witnessed, or only in a slight degree; but *loss of memory* is noted by one author, and was a spontaneously mentioned symptom by two of my patients. The frequency of the attacks varies greatly. One of Charcot's patients had fifteen or sixteen a day, and one of mine, seven or eight. On the contrary, the second of my patients had very infrequent seizures, with intervals of remission of many years, the first attack dating thirty years back. The *duration* of the 'fit' is very short, and the *recovery* as a rule so complete, that the patient resumes his meal, occupation, or conversation immediately. The record of **objective symptoms** is very incomplete, and is often omitted. Some hyperæmia of the larynx, or congestion, with granular pharyngitis, is the most that has been generally noted; while in one or two instances chronic bronchitis, and in one the presence of emphysema, have been specially mentioned. The physical evidence that I have particularly remarked, not only

in these three pronounced cases, but in others of obstinate paroxysmal cough without actual vertigo, has been a distinct and considerable degree of varix of the base of the tongue and upper part of the larynx, with a corresponding hyperæmia of the nares. I have for so many years urged that capillary venous engorgement is the cause of granular pharyngitis, that I can readily explain the association of this last condition with the cases reported by other observers; and I suspect that some form or other of varix in the pharyngeal and naso-pharyngeal regions would be almost always, if not invariably, found when looked for, and that in many cases considered as instances of purely laryngeal, or purely nasal reflex, the association of the two will, in the future, be more frequently recognised. I have, indeed, no doubt that in many cases of aural vertigo also, nasal or pharyngeal hyperæmia is more frequently a concomitant symptom than is recorded. That all or any of these conditions may and are often the result of a fault in the systemic circulation, I readily admit; but I am equally convinced that the special circumstances of their localization require to be reckoned with in connection with treatment. Before proceeding further I will relate my cases:

Case 1.—Mr. T., aged 61, a wine-merchant, was seen by me in consultation with Dr. Keele, of Islington, on November 30, 1886. He complained that for three years he had suffered every winter from irritation at the top of the throat, but he had got well in the summer.

So long ago as thirty years previously he had suffered from giddiness while smoking a cigar, the smoke seemed to have gone the wrong way; this made him cough, and he fell down immediately after, in an absolutely unconscious state. Since then he had not smoked, and he now dreaded the atmosphere of tobacco, as it always predisposed to, if it did not induce, an exacerbation. On and off, at intervals of even years, he had had repetitions of these attacks of cough, followed by giddiness and unconsciousness, and once, four or five years before, a pinch of snuff had caused him to 'drop on the floor dead in a minute.' He was then reminded of the circumstance previously forgotten, that snuff had induced a milder attack of the same nature once before.

Two years previously he had, on leaving a tram-car at the corner of his street, dropped insensible on the kerb. He had been hurried in crossing to the pavement, and remembered that he had a catch in his breath, with cough, before he fell.

The patient was an apparently healthy man, though rather florid in colour, and inclined to make himself an invalid, so much did he dread exposure to cold or any inclemency of weather. His chest was healthy, and his heart sounds fairly good, though the action was somewhat slow. On looking into his throat I saw that his uvula had been reduced, and, as he said, with advantage. Proceeding downwards I then observed in the mirror slight congestion of his larynx; but above all, there was extreme varix of the base of the tongue, and of the lingual surface of the epiglottis. He said that he had been a fairly temperate man, but that in the exercise of his vocation he had 'tasted' a great deal. He had discovered that his symptoms were always worse after such occasions. I recommended astringents, and later destruction of the varicose veins. I recently heard from Dr. Keele that he derived undoubted benefit from my advice, but he has not yet summoned courage to undergo an attempt at a more radical cure.

Case 2.—Mr. William C., aged 62, from Retford, consulted me on October 20, 1886, with the following history:

He stated that six or seven years previously he had first been attacked with giddiness, which would cause him to fall insensible, and that this would occur seven or eight times in one day. He had not at first noticed that these attacks were always preceded by a cough, though he had long been aware of irritation in his throat, but as time went on the association was noted to be invariable. He described his sensations when unconscious as 'most delightful.' There was a tickling in the throat, a slight cough, and then a hardly more than momentary but complete loss of consciousness, which he found most calming to himself, though it was of course a very terrifying matter for his wife and children. He personally had not become frightened till he found he could not walk straight, and had to hold on to railings or to someone's arm to prevent his reeling. Once or twice his gait had led to the formation of unjust suspicions as to his sobriety.

About the year 1882 he had been under the care of another throat specialist, and having undergone a long course of insufflations, with only a slight alleviation, derived immediate benefit on his uvula being cut. For a short time there was a complete cessation of his attacks, and though they soon returned, he had not since the operation had more than one a day. A new symptom had developed, namely, *intense headache* between the brows on the slightest cough, accompanied by a pain and rigidity in the shoulder, which extended down the right arm to the thumb.

The patient was rather markedly pale in complexion, but as far as could be ascertained, free from organic disease.

On examining his nares, I found enlargement and hyperæmia of both inferior turbinated bones, with increased congestion of the left middle turbinated bone, and of the left nostril generally. At the base of the tongue there was a large congery of varicose veins, with some hæmorrhoidal prominences. This condition also was worse on the right side. There was some dyspepsia, but otherwise fair general health.

The following was the treatment: Destruction of the veins by the galvano-cautery, searing of the nostrils also by the same process, administration of an alkaline tonic (Form. 97), use of vaseline, with cocaine and eucalyptus oil, to the nostrils, and employment for several hours a day of an oro-nasal inhaler, containing ozonic ether and pine oil (Form. 41). He made great improvement, and after three months reported that he had not had one fit; but though the headache had been less, it was not entirely relieved. I found all the veins had not been destroyed; the cautery was therefore again repeated (recently), with, so far as can be seen, further marked benefit to his symptoms.

Case 3.—Dr. ——, aged 42, consulted me recently on account of giddiness—which he carefully distinguished from a mere dizziness—that occasionally arose when he sneezed, coughed, or blew his nose with the least increase of vigour. He stated that he always had a premonition of an attack, and had acquired the precautionary habit of holding on to a chair or other support when about to cough or sneeze. He had distinct confusion, and a feeling of cerebral tension; but had only once—twenty years ago—been absolutely unconscious.

Lately, attacks of sneezing had been more frequent, and he had also suffered from nocturnal dyspnœa, which he considered of the nature of asthma. The patient had practised for twenty years in a poor neighbourhood of London. As a student in Dublin he had drunk rather hard, and on coming to town had taken freely of beer, though he had abjured spirits. Since a previous consultation with me two years ago, he had been almost an abstainer. The present local condition was one of hyperæmia of the turbinated bones, an exceedingly relaxed uvula, and varix at the base of the tongue. The treatment adopted was similar to that in the last case. It is too early to speak of result.

There has been much speculation on the nature of this neurosis. Charcot believes that the origin of the symptoms incident to the affection lies in a peculiar irritation of the centripetal laryngeal nerves; that the laryngeal neurosis is, in many respects, to be compared with the aural vertigo met with in Meniere's disease.

Gray first suggested that whereas in the laryngeal malady there is almost always unconsciousness in addition to vertigo, the former symptom is wanting in the auditory affection. It is to be added that in aural vertigo there is a more real disturbance of locomotor co-ordination than what is generally seen in the laryngeal analogue. In my second case, however, locomotion was distinctly and consciously disordered, and in a minor degree in the third. The same feature was observed in Krishaber's case. McBride rejects Gray's view, that the neurosis is rather of the nature of an epilepsy than a vertigo, because consciousness was not completely lost in every instance. It certainly was, however, in the majority. The same might be said with regard to muscular contractions. There is an admitted laryngeal spasm in every case, but in a few only similar manifestations in the limbs. In McBride's patient there was exaggerated tendon reflex, ankle clonus, spasmodic contractions of the palatal muscles, and occasionally spasmodic stricture of the gullet. In answer to this objection of McBride, the following remarks of [35]Brown-Séquard on general epilepsy are very much to the point:

'Of these two features—muscular spasm and loss of consciousness—neither is alone sufficient to establish the existence of epilepsy. Still each of these two kinds of symptoms when occurring in the form of an attack, is an *epileptiform* manifestation. . . . . Two patients, who were brother and sister, were incompletely epileptic; one had only attacks of convulsions, the other only attacks of loss of consciousness. Their father had been completely epileptic, and one of these two young patients had inherited one aspect of the disease, the other the other aspect.'

Again, Russell Reynolds states that he has seen attacks of *petit mal* with no other symptom than a loss of consciousness, and Brown-Séquard on this point says:

'therefore we must admit that sometimes a pure and simple loss of perception is all that exists in a seizure of *epilepsia mitior*.'

For my own part, I do not see how one can escape the conclusion that the condition we are considering has more in common with the milder forms of epilepsy than with simple vertigo, and with the greatest deference for his opinion, it is difficult to understand how Charcot, in classing the affection as a vertigo, overlooked the convulsive symptoms in his third case, which have been already quoted. The movement of the arm in his patient, and the pain and rigidity in the shoulders and along the arm in mine, strikingly call to mind Brown-Séquard's remark that

'in cases of epilepsy due to organic cerebral disease, or to cerebral congestion (much more rarely in other cases), there occurs rather frequently, either during the attack or before it, drawing of the head towards one shoulder.'

Muscular contractions in this neighbourhood are probably

accounted for by reflex stimulation of the spinal accessory nerve; and the symptom of this character which was exhibited in my second case is allied to the 'tonic spasm in the region of the sterno-cleido-mastoid muscle,' to which [36]E. Fraenkel has alluded as a disagreeable sequel of galvano-caustic applications to the naso-pharynx.

I have said that Brown-Séquard does not specially allude to laryngeal epilepsy, but his table of causes and effects of the general malady, which was prepared so long ago as 1857, indicates in particulars his recognition of a laryngeal aura, or at least of the presence and importance of tonic contraction of the laryngeal respiratory muscles; and his observation in this particular is generally recognised.

McBride, amplifying Krishaber's definition of the malady, calls it 'complete spasm of the glottis in adults;' but unfortunately Krishaber's case is the only doubtful one of true laryngeal vertigo or epilepsy of the whole fourteen on which McBride bases his conclusion. The fact that there is always a complete spasm of the glottis does not, in my judgment, warrant us in ignoring that the reflex effect thereof is to induce a nerve-storm, or, in other words, adopting the Brown-Séquard definition of epilepsy, 'an apyretic nervous affection characterized by seizures and loss of consciousness, with tonic or clonic convulsions.'

The connection of epilepsy is still more strongly marked in the case of reflex *nasal* neuroses, as will be seen by reference to the cases observed by others besides myself, which are reported in the next chapter (p. 493).

And this brings me to say that whatever name we may give to this affection, there will probably be general unanimity as to McBride's explanation of the mode in which it is brought about, namely, by cough; in other words, by a series of spasmodic inspirations, followed by spasmodic expiration, with more or less complete closure of the glottis. This spasm results in increased atmospheric pressure on the walls of the pulmonary alveoli, which in all probability prevent, or tend to prevent, the free passage of blood through the lungs, and therefore lessen the blood in the left side of the heart; the pressure on the large intra-thoracic veins hinders the return of venous blood, and thus we understand that the face will be pale or turgid, according as the spasm of the glottis lasts for a longer or shorter time. This theory is supported by the addition of interesting facts from [37]Weber on the effects of forced expiration with a closed glottis, and by sphygmographic tracing in the same circumstances.

Whilst agreeing with the view that alteration in intra-thoracic blood-pressure from glottic spasm is the prime factor in the in-

duction of the nervous phenomena, I am strongly of opinion that this vascular disturbance almost invariably exerts a marked effect on the cerebral circulation, which finds expression, sometimes in epileptiform manifestations, sometimes in simple syncope; nor does their peripheral reflex origin militate against this view of their central connection. A quite recent paper by [38]Brown-Séquard, only published as these pages are passing through the press, confirms this view, the author holding that peripheral irritation in the region of the neck is capable of producing inhibition of cardiac, respiratory, and cerebral activity.

PROGNOSIS as gathered from recorded cases is favourable, since the disease is amenable to properly directed remedial measures; but the symptoms are decidedly alarming, and the possibility that fatal cases of this character may have been registered under the heading of a cardiac failure or a cerebral lesion must not be overlooked.

TREATMENT.—In almost every case that has derived benefit, attention has rightly been directed to the pharynx rather than the larynx. As to general measures, though bromides have allayed and doubtless will continue to allay symptoms, I should prefer iron and digitalis, or iron and ergot, with saline purgatives, moderate diet, and the avoidance of alcohol and tobacco.

Local treatment must be directed to relief of the particular local cause of the disorder, full directions for which will be found in the foregoing pages under the headings of 'Pharyngitis' (p. 197), 'Relaxed Uvula' (p. 232), or 'Chronic Laryngitis' (p. 294). They have also been indicated in the history of the treatment of my cases, and it is hardly necessary to repeat that I have found especially beneficial results from destruction of enlarged veins and hyperæmic hypertrophies by means of the galvano-cautery.

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CHAPTER XXIV.

THE GENERAL ETIOLOGY AND PATHOLOGY OF NASAL AND NASO-PHARYNGEAL DISEASES.

In a previous portion of this book (Chapter I., p. 31 *et seq.*), I have described the crude anatomy and physiology of the nasal passages, have given (Chapter V., p. 74 *et seq.*) directions for their examination, and have repeatedly insisted on the importance of recognition and treatment of diseased states in these regions in relation to a more complete diagnosis and relief of throat conditions than is otherwise attainable.

It is not, however, possible within the limits prescribed to me, to treat of diseases of the nasal fossæ with the same detail as has been afforded to those of the pharynx and larynx; nor, indeed, is it altogether necessary, for although the subject is of the highest importance, and, moreover, of almost fascinating interest, and capable of application and elucidation in many varied aspects, the actual morbid conditions may be generalized under a comprehensive classification of quite moderate limits.

I propose, therefore, to review, as it were, our present knowledge of the subject from a general standpoint, and then as concisely as possible to indicate the principal symptoms, functional and physical, as well as the lines for treatment, of the more usual nasal diseases to be met with in practice.

THE NASAL MUCOUS MEMBRANE.

The nasal chambers are not only the seat of the sentient surface connected with the sense of olfaction, but they are the natural avenues through which the air reaches the organs of respiration, audition, and voice-production. When the nasal membrane is diseased, neighbouring portions of the respiratory tract are, as a consequence, more or less profoundly affected: (1) By direct extension of the morbid process to contiguous areas; (2) by abeyance of the function of warming, moistening, and filtering inspired air, in consequence of which the latter enters cold, dry,

and loaded with foreign particles, thus conducing to disease of the pharynx, larynx, lower passages, and even lungs; and (3) by reflex induction of certain neuroses in adjacent correlated tracts. Under this last heading are included nasal cough, many forms of asthma, hay fever, nasal vertigo and allied conditions.

In order to thoroughly appreciate morbid conditions of the mucous lining, we must consider its structure somewhat more minutely than has been done in the anatomical description of our first chapter.

We have already seen that the nasal membrane is continuous with that of the pharynx, and extends into the antrum of Highmore, and other accessory cavities, as well as into the Eustachian tube. The superficial portion of the membrane may be roughly divided, according to its microscopic character and physiological functions, into *two portions:* a superior or olfactory, and an inferior or respiratory tract.

Olfactory Region.—This portion of the nasal cavity includes the upper half of the septum, the superior turbinated bone, and the upper half of the middle one; the membrane in this situation is more closely adherent to the periosteum, and relatively thinner than in the respiratory area. The following points merit especial attention, viz.:

I. That the olfactory portion is not very vascular.

II. That it is only moderately supplied with glands, which are of the variety known as serous.

III. That it is of a rather pale sepia colour, due to the presence of a pigment in the epithelium cells and glands.

IV. That the substance of the membrane consists mainly of non-medullated nerve-fibres—the terminal branches of the olfactory nerves which, after passing through the fifteen to twenty apertures of the cribriform plate of the ethmoid, are distributed solely to the olfactory region; the tract is also supplied with nerves of common sensation.

The superficial lining of this area of special sense consists of a stratified and tesselated columnar epithelium, whose free surface is destitute of cilia. Between these columnar cells are situated the olfactorial cells of Schultze, delicate spindles, each with a spherical nucleus. The cell substance surrounds the nucleus as a thin zone, and sends one prolongation towards the free surface, and another more deeply to join a delicate nerve-plexus, the ultimate ramifications of the olfactory nerves. If these olfactorial cells are destroyed, the sense of smell is lost just as completely as if the olfactory lobes or nerves had been sectioned.

There are so many points of importance concerning the respiratory functions of the nose, that it is quite impossible to discuss at length the many interesting and obscure phenomena connected with olfaction. Suffice it to say that the sense of smell is dependent on a healthy condition of the olfactory and trigeminal nerves, on the due nutrition and moisture of the mucous membrane, and on the presentation of the odoriferous material to the olfactory region in a state of vapour or perhaps of very fine powder. Beyond this little is positively known as to the exact manner in which an odorous substance at a distance is able to produce the sensation and perception of smell. [1]Graham started the hypothesis that olfaction consists essentially in an oxygenation of the odorous material within the nostril, and in the stimulant effect of that chemical process upon the sentient nerves of the olfactory region. This theory certainly harmonizes with the fact that odorous substances in general, such as ethers, aldehydes, and essential oils, belong to the organic kingdom, and can be readily acted on by oxygen. Chemical action no doubt affects the nasal membrane, as in those cases in which inhalation of gases such as ammonia and sulphurous acid causes a sense of pungency; but this is not the kind of chemical action understood by Graham, for it is probable that pungency is due to stimulation of, not chemical action on, the terminal branches of the nerves of common sensation (fifth pair).

A view opposed to that of Graham is the vibratory theory, originally suggested by [2]Dr. William Ogle, according to which odorous impressions are considered to be the result of vibrations. Basing his view on the fact that pigment is present in the olfactory region and essential to perfect olfaction, much in the same way that luminous vibrations are absorbed by the choroidal pigment, Ogle, in an article on 'Anosmia,' brought together a number of facts to show that albino animals are deficient in pigment and in the sense of smell; as a consequence they die early, being handicapped in the struggle for existence by their inability to protect themselves against poisonous plants, dangerous inhalations and insanitary habitations.

The part played by the olfactory region in the perception of flavours is well known: savoury meats and wines are really smelt, a fact which can be proved by plugging the anterior and posterior nares, and it is further confirmed by the constant association of want of perception of flavours with loss of smell.

Anosmia may be occasioned by several classes of lesions: first, by mechanical impediments to the admission of odorous molecules

to the sentient surfaces—amongst these causes may be named *polypi, rhinal calculi, congenital* or *cicatricial malformations* of the *nostrils, deviations* of the *septum, acute* and *chronic thickening* and *swelling* of the *membrane,* all leading to *stenosis.* Secondly, the function is impaired by all nutritive or destructive changes of the membrane, which lead to degeneration of the glands and nerve filaments. Under this heading come such destructive lesions as *atrophic rhinitis, strumous, syphilitic,* and other forms of *caries* and *necrosis;* disordered nutrition and loss of function are also occasionally directly associated with *paralysis* or *paresis* of the *trigeminal nerves.* And thirdly, anosmia may result from various lesions causing *destruction* or *impaired* functions of the *olfactory nerves* in their continuity, as by *fractures* and *new growths,* or centrally by *disease* of the *olfactory lobes,* or other intracranial mischief. In all of these instances the lesion may be unilateral. It remains to be added that the cause may occasionally be much less directly nasal.

I was consulted, in April, 1879, by a lady on account of loss of smell, for which I could find no reason beyond a chronic pharyngitis and a very relaxed uvula. For the relief of the pharyngeal trouble I reduced the lengthened uvula by abscission, with the somewhat unexpected result that the anosmia was entirely cured. Since that time I have seen other instances which have assured me that this experience was not unique.

I have already alluded to the intimate connection of the fifth pair of nerves with the sense of olfaction. These nerves doubtless preside over several separate functions, and contain distinct kinds of fibres for their due performance. Thus one set regulates the working of the local vaso-motor mechanisms and the blood-supply of the mucous membrane; another controls the amount and character of the glandular secretion; yet another set—the trophic fibres—will preside over the nutrition of the part; whilst a fourth will respond to the stimuli of common sensation, and warn the lungs of the approach of irritating bodies and gases.

It is not surprising, therefore, that olfaction should be impaired by anything which interferes with the due performance of these varied functions of the fifth nerve; and this is amply borne out by clinical experience, as will be seen when we come to consider the symptoms of various nasal diseases.

Respiratory Region.—The membranous lining of the lower or respiratory area is pink in colour, and consists superficially of two layers of columnar cells with conical ends; the bases of the cells of the outer layer look towards the lumen of the fossæ, and are amply ciliated. In this respect, the epithelial lining differs markedly from that of the olfactory region, where, as we have

seen, the columnar cells bear no cilia, and the smoothness of the membrane is only interrupted by the little projecting ends of Schultze's cells. Beneath the epithelium is found the usual basement membrane, a structure presenting little differentiation, but perforated for the transmission of the terminal branches of the fifth pair of nerves and for the gland-ducts. Underneath this apparently unimportant structure is found a mass of adenoid tissue, more or less diffuse, but here and there aggregated as lymph-follicles. These collections of lymphoid tissue form a potential *nasal tonsil*, whose function is doubtless to secrete serum, and leucocytes, for scavenging purposes, into the rhinal passages. In the deeper portion of this, which is often known as the mucous layer, are found a large number of glands, the alveoli and ducts of which are grouped together in corresponding lobules. These glands are of two kinds, the mucous and serous. The latter, which are identical with the true salivary glands in structure, are much larger and far more numerous than the former. There is, however, one feature about these glands which is of both physiological and pathological interest: viz., that in the thicker areas of the mucous membrane, the alveoli, especially those near the surface, are filled by large and small globules of fatty matter resembling that found in sebaceous and Meibomian glands. In ozæna the crusts and discharges usually contain decomposing fatty globules, and micro-organisms; hence the offensive odour.

[3]Klein describes fine bundles of muscular fibres as occurring in the inter-alveolar tissue of Guinea-pigs and rabbits, and considers that their function is to aid in the discharge of the gland-contents; he, however, makes no allusion to similar structures in man. In this matter modern works on physiology are somewhat behind the times, for mention is not made of what anyone will readily make out who takes the trouble to remove and examine microscopically a portion of the membrane covering the inferior turbinated bone, namely, an erectile tissue of venous sinuses and fibro-muscular trabeculæ, homologous with the corpora cavernosa of the penis. This layer of erectile tissue is limited principally to the respiratory portion of the nose—that is, to the lower parts of the septum, and the inferior turbinated bodies; but it is also to be found in the deepest layers of the mucosa covering the superior and middle turbinal bones; it is, however, on the inferior turbinal that it attains its greatest development. The veins from these sinuses pass in five different directions, viz., to the plexuses of the face, cranium, orbit, soft and hard palate.

[4]John N. Mackenzie has recently shown that so long ago as

1769 [5]Morgagni drew attention to the peculiar and 'red thicknesses of the membrane of the nose;' from his description he appears narrowly to have missed the discovery of the turbinated erectile tissue. [6]Toynbee, in his 'Diseases of the Ear,' says: 'Many years ago I pointed out the peculiar *erectile tissue* of the nasal mucous membrane, not only in man, but in other mammalia; this tissue is a most efficient respirator.' In 1853, [7]Kohlrausch injected the tissue from the jugular vein, and looked on it as a '*cavernous network of veins* just underneath the mucous layer.' Such a plexus had been previously referred to by [8]Hyrtl, and was subsequently claimed as an independent discovery by [9]Kölliker. Kohlrausch evidently mistook the erectile spaces for venous trunks, and failed to appreciate the true contractile or erectile character of the tissue, which was subsequently set forth by [10]Bigelow in 1875. This last-named observer, in an article familiar to all specialists, described the tissue with great accuracy, and defined its limits. Bigelow was the first to observe the alternate inflation and collapse of the erectile bodies, thereby leading the way to the rational interpretation of nasal affections. From their resemblance to the cavernous structures of the penis he gave them the name of the *turbinated corpora cavernosa;* but as [11]Zuckerkandl has pointed out, they may with more propriety be classed amongst the contractile tissues. At the International Medical Congress in 1881, [12]Bosworth described the tortuous condition of the arteries of the turbinated bodies, the so-called *helicine arteries;* and he also drew attention to the fact that in hypertrophy of the turbinated mucous membrane there is overgrowth of the surface layer, of the adenoid layer, of the racemose glands, and of the connective tissue between the enlarged vascular sinuses.

In a more recent contribution [13]Bosworth has denied the erectile nature of 'the true erectile tissue' of Bigelow, to which he formerly subscribed. He believes that nasal serosity is largely due to exosmosis direct from the vascular tissue, and not to glandular mechanism. Such exosmosis from the venous sinuses may occur, but it must be an insignificant factor in the production of the rhinal fluids. Undoubtedly, however, the lymphoid tissues contribute to the secretion, which is usually believed to be the exclusive result of the activity of the mucous and serous glandular mechanisms. [14]Bosworth makes the extraordinary statement that in the nasal mucosa 'there are no serous glands,' whereas, as has been remarked above, the serous glands are both larger and more numerous than the mucous.

No good purpose would be served by a recapitulation of the

sizes and shapes of cells and other details which have no very important bearing on etiological and pathological considerations; but it is necessary to dwell, albeit briefly, on the **normal physiological functions** of the respiratory region.

The **nostrils**, in the first place, offer a double aperture for the admission of air; floating dust and coarse particles are caught by the vibrissæ or hairs which keep sentinel at the entrance; the moist and ciliated mucous lining is eminently adapted by its irregular contour and its vibratile cilia to catch any finer particles which on being deposited act as stimuli to the glands; as a result, a secretion is poured out which veritably sluices the nostril. The cilia, however, work in the direction of the naso-pharynx; it is therefore probable that in health the secretion of the nasal glands is carried to the throat, and there either re-absorbed or swallowed; when the balance between secretion and its physiological removal by backward ciliary action is interfered with, as in acute catarrh, a running from the nose results. It will be seen, therefore, that the cilia in the respiratory tracts of the nose have a very definite and important function to perform, viz., the removal of mucus and of foreign bodies deposited on the surface from the inspired air. If these cilia are destroyed this function ceases, and as a consequence a chronic inflammation results, with all its train of evils in the way of hypertrophies and hyper-secretions; atrophy, with arrested or perverted secretion; polypi, etc. It is my conviction that destruction of the cilia is often the first pathological change in a chronic catarrh; and if so, one readily recognises the evils of snuff-taking and tobacco, of alcoholic fumes, and also of medicated inhalations of a pungent or irritant character.

In all probability, however, by far the most important function of the nostril is, not to simply filter the air from dust, but to warm and moisten it. [15]Morell Mackenzie alludes to some experiments which tend to prove this point; and more recently [16]Aschenbrandt has, in the physiological laboratory of Professor Fick, at Würzburg, conducted some more accurate investigations in the same direction. His method was to estimate the difference between the temperature and moisture of air passed by a glass tube through the mouth to the posterior nares, thence through the nasal fossæ to the anterior nares. These experiments conclusively prove that almost the whole of the brunt of moistening and warming the inspired air is borne by the nose during normal breathing. There can be no doubt that the complexity and freedom of the vascular and glandular supply of the nasal fossæ

in health are well adapted for the thorough carrying out of this function. Even in mouth-breathers and in those obliged to respire through a tracheotomy-tube, the exspired air is always hotter and moister than the inspired, and it stands to reason that the lungs must in such cases *lose heat*—(1) by conduction, whenever the temperature of inspired air is less than blood-heat; and (2) by loss of heat brought about by *evaporation of water* from the lungs, on account of the low vapour tension, due to the fact that the air has not been moistened in the nose. This state of affairs, which exists whenever there is blocking of the nostrils or of the naso-pharynx, necessarily acts prejudicially on the lower air-passages in particular, as well as on the organism at large.

[17]Bloch's important and valuable physiological investigations on nasal respiration led him to formulate, amongst others, the following conclusions:

1. The temperature of the inspired air is considerably raised while passing through the nasal cavities, the expired air being 1·5° to 2° C. higher after nasal respiration.
2. The thermogenic action of the nasal mucosa is greater when the temperature of the external air is lower; this thermogenic effect is constant, and depending on the relations of the external temperature and the temperature of the body, can be expressed, under normal conditions, by the formula $E = \frac{5}{9}(37 - t)$.
3. The thermogenic action of the buccal cavity is slight, compared with that of the nasal.
4. The heat given up by the mucosa of the nose (and its diverticula) at each inspiration, and at a moderate external temperature, is equivalent to 6 gramme-calorics.
5. Inspired air passes out of the nose about $\frac{2}{3}$ saturated. (Keyser and Aschenbrandt, however, maintain that it passes out *fully* saturated with moisture).
6. The nose, though not a perfect filter of dust, retains the greater part of the solid particles inspired; the amount filtered depending on the viscidity of the mucosa, and the weight, size, and hygroscopic properties of the solid matter inhaled.
7. During normal nasal respiration the tongue is pressed against the palate and the mouth is kept closed, both anteriorly and posteriorly, solely by the pressure of the external air.
8. Every *considerable* mechanical, chemical, or thermic stimulus acting upon the nasal mucous membrane through the

inspiratory air current, induces an immediate cessation of the respiratory act. This respiratory standstill is immediately succeeded by an inspiration. It is probable that weak stimuli retard inspiration, and that very strong stimuli induce an immediate expiratory effort.

[18]MacDonald's observations are in substantial agreement with the more comprehensive ones of Bloch.

The function of the **Nose in Voice Production** has been frequently alluded to in this work, but a few words of recapitulation will here be useful. Voice is due to the vibrations of a column of air passing up from the lungs, through the larynx, to the mouth and nose; the *pitch* of the voice is regulated by the tension and approximation of the vocal cords, the *volume* by the force of the pulmonary blast through the glottis, while *tone* is dependent on the shape of the oral, nasal and pharyngeal cavities, and on the movements of the palate and pillars of the fauces. Articulate language depends, in addition, on movements of the palate, tongue, cheeks, and lips. In uttering the vowel sounds, the nasal cavity is shut off from the mouth by the soft palate, whilst the velum is relaxed in forming such letters as *m* and *n*, which are said to possess a nasal twang. Helmholtz has shown that the fundamental note originating from vibrations of the vocal cords gives rise to a series of secondary vibrations of the current of air in the nasal cavities, which over-tones serve to reinforce the harmonics of the voice and add to their quality. Phonation and articulation are therefore not only impaired in the victims of nasal obstruction, but in this condition singing in the falsetto register is impossible.

From what has been said it will be seen that in the discharge of its respiratory function the nasal passages are constantly exposed to ever-changing atmospheric conditions of heat and cold, dryness and moisture. The amount of its blood-supply and glandular secretion will, therefore, vary with every barometric fluctuation, with every breeze that blows, and with every vitiating influence of the atmosphere. In order that the membrane may from time to time adapt itself to these constantly variable circumstances, it is evident that a sensitive and regulating nervous mechanism will be required to correlate and control the activity of the glandular and vascular supply. Such a mechanism evidently does exist in connection with the spheno-palatine ganglion and the fifth pair of nerves. The sensitiveness of this area is beyond all question; for the nasal lining readily responds to direct stimuli, whether mechanical, chemical, galvanic, or thermal; the immediate effect

is usually a blanching of the membrane, to be followed, according to the nature and duration of the stimulus, by a more or less obvious congestion and swelling of the erectile structures and an increased secretion.

This congestion or erection of the vascular portion of the membrane generally, and of the turbinated corpora cavernosa in particular, with accompanying hyper-secretion, is the condition *temporarily* met with in every ordinary catarrh, and *permanently* established in the swollen state of the membrane known as *rhinitis hypertrophica*. [19]Seiler, [20]John Mackenzie, and other Americans, and more recently Continental workers, have shown that the fully established hypertrophic condition is the final result of constantly recurring abnormal erections of the turbinated corpora cavernosa and other vascular sites in the nose. It must not, however, be assumed that the stimuli necessary for this erection need be applied directly to the interior of the nostril, for a number of experimental and clinical data clearly show that this is much too narrow a view. Mechanical irritation, as from particles of snuff, the pollen of grasses and other flowers, fine dust, etc., is almost as important a factor in the production of nasal erection as changes in the temperature of the atmosphere; and if long continued will certainly lead to a permanently enlarged, swollen, and hypertrophied condition of the erectile tissue and mucous membrane generally; but this state of affairs can be brought about in quite a different manner than by direct stimulation of the membrane producing reflex erection. [21]Woakes, who is most enthusiastic on this question of correlated action, has drawn attention to a number of examples of peculiar reflex functions of the nervous system which obtain in connection with organs supplied by the upper portion of the sympathetic system. To take a simple example: in passing a Eustachian catheter one often notices, amongst other things, excessive lachrymation. In this case, clearly the nasal membrane is in nervous connection through the sympathetic system and ganglia with the tear gland. Conversely a flash of light will cause sneezing. Stimulation of one spot produces vaso-motor dilatation of the vessels of another. This is because the nervous mechanisms of the two areas are correlated and intimately connected, which connection, however, is usually only rendered evident under the influence of some exceptional or powerful stimulus. In the example quoted the two correlated areas are separated by only a few inches of nervous tissue, but the correlation existing between the breast and organs of generation shows that two quite distinct structures may be

affected in unison if only the nervous connection be intact; and this fact the better enables one to appreciate the remarkable essay by John Mackenzie, to which allusion has already been made (p. 33), on 'Irritation of the sexual apparatus, as an etiological factor in the production of nasal disease.' This author calls attention to the intimate physiological relationship which exists between the nasal and reproductive apparatus, which is partially explained by the theory of reflex or correlated action, partially by the bond of union which exists between the various erectile structures of the body. He draws attention to the fact that in a certain proportion of women with healthy nasal organs, engorgement of the turbinated corpora cavernosa occurs regularly at each menstrual flow. This is physiological.

Clinically there are some facts which appear to lend support to this view, for it is often noted, if due inquiries be made, that nasal affections become much more troublesome at the menstrual epoch; the symptoms are aggravated, and in ozæna the discharge is decidedly more fœtid. Of this fact I have long been cognizant in my own practice. Again, epistaxis in boys and girls at puberty, and vicarious nasal menstruation, are quite in accordance with the same hypothesis. There are some who always suffer from coryza after a venereal debauch; and nasal diseases are constantly aggravated by sexual excesses. It is probable that the same fact obtains in connection with masturbation. Finally, it is quite possible, to quote John Mackenzie, 'that congestion of the nasal erectile tissue precedes, or is the excitant of, the olfactory impression that forms the connecting link between the sense of smell and erethism of the reproductive organs exhibited in the lower animals.' That a relationship exists, by virtue of which irritation of the genital organs reacts upon the circulation and nutrition of the nose, is therefore rendered highly probable by the evidence of clinical investigation.

If this excitation of the nasal membrane be carried beyond its physiological limits, there comes a time sooner or later when that which is a normal process becomes a pathological one, according to a well known law of the economy. It is in this way that various stimuli, whether applied directly within the nostrils or reflexly through the nervous system, bring about in course of time chronic congestion and disordered nutrition of the nasal membrane, leading to general swelling and proliferation of the constituent elements and of the turbinated bodies; in point of fact, to the condition known as *hypertrophic rhinitis*.

On the other hand, congestion and hypertrophy may, after a

longer or shorter time of perverted growth and secretion, lead to an increase of the connective-tissue elements of the membrane; these ultimately contract and culminate in fibroid shrinking and in atrophy of both membrane and bone. *Chronic atrophic rhinitis* is thus established, the ciliated epithelium is lost, the now viscid and fatty secretion is not swept away by the ciliary action, microbic growth and decomposition takes place, and ozæna is the final result. But it is not always true that *rhinitis hypertrophica* gives place to the atrophic state, nor conversely is it a fact that *atrophic rhinitis* is *always* a result of hypertrophy, though such is generally considered to be the more usual sequence of events. Occasionally atrophy is the chief factor from the commencement; but the precise mechanism and set of causes which tend to bring about this condition without previous hypertrophy is at present ill understood, and requires elucidation. [22]Bosworth's suggestion that it is due to drying and retention of the mucus on the surface, since it does not explain such antecedents as loss of cilia and altered secretion, is inadequate. It is a question worthy of consideration whether in some cases of so-called atrophic rhinitis, and especially those in which there is abnormal smallness of turbinated bone, there has ever really been a proper development in the first instance, and whether the condition does not represent a consequent inability of the tissues to perform their natural functions. These remarks apply more particularly to that form of the disease known as *strumous ozæna*, which, commencing at six or seven years of age, so frequently manifests improvement at the period of puberty.

Hypertrophy of the membrane, instead of resulting only in general thickening, which is most prominent over the septum and turbinated bones, may show further evidences of disordered nutrition and growth in the shape of defined *hyperplasiæ* and distinct *neoplasms*.

It is beyond the scope of this chapter to go into the whole question of the etiology and pathological histology of nasal polypi; but it may be briefly stated that they are exuberant growths containing in a greater or smaller proportion the elements of the mucous membrane from which they spring. Chronic inflammation and *ab extra* irritation seem the most potent factors in their etiology. The situation of true polypi indicates that they often originate as a circumscribed *œdema* of pendulous portions of the mucous membrane. My own experience tends toward support of the view that a *polypoid diathesis* may be a factor of importance.

I have seen two cases in which nasal polypi were associated with laryngeal growths; and others in which there were warty growths on the uvula or some other portion of the soft palate. I have also been told by patients with nasal polypi, that they have suffered from similar neoplasms which have required surgical treatment in the uterus and rectum. Lastly, I have recently removed a very large polypus blocking up the whole of the right nostril and dropping back into the post-nasal space, so that it could be seen by oral examination. The growth had probably commenced about three years previously, and at about the same period, the patient, a young lady, then eighteen years of age, noticed several little pendulous warts forming on the right side of the neck, and limited to that situation.

And allied to this question is that of heredity of nasal polypi, and of family predisposition to nasal hyperplasiæ. Of this circumstance I can recall several instances:

I have operated on three brothers in one family for nasal polypi; have lately treated a young lady for nasal polypus, whose mother has also a similar growth—never operated on—which is, I believe, the chief cause of a chronic bronchitis; and still more recently I have removed a polypus from a lady, aged 51, who has yet a closer family history in the same direction. Her mother was the subject of an enormous polypus which would protrude from the nostril and could be pushed back into the throat. It was never removed, and the subject of it died suddenly with symptoms of suffocation. The mother of this last-named lady had also polypus, and her father's brother was similarly afflicted.

We have seen that the circulation and nutrition of the nasal membrane is capable of being affected reflexly by stimulation of some other such distant portion of the body as of the generative organs, and conversely we should expect to find that stimulation or irritation of the nasal membrane would cause reflex effects elsewhere. The simple experiment of passing a catheter or probe into the nose, to which I previously alluded, causing, amongst other things, sneezing and lachrymation, is ample proof that such is the case. But there are a number, and a continually increasing number, of clinical data which support the view that the presence of nasal polypi, hypertrophied turbinated tissues and foreign bodies in the nose are intimately connected, if not the actual cause of various asthmatic symptoms. [23]W. H. Daly, [24]Roe, [25]Hack, [26]John Mackenzie, and [27]myself, have all reported cases of asthma, hay-fever, and rose-fever, which were cured by simply treating the diseased nasal membrane; but the first to point out the fact of the connection was [28]Voltolini.

[29]Predborski has recorded a case of a young Jewess who suffered from *aphonia*, accompanied by paroxysms of dyspnœa, one of which was so alarming that tracheotomy was contemplated. The nose showed redness and tumefaction of the turbinated areas; touching them produced pain, sneezing, and mucous discharge. Chromic acid cauterization cured the nasal affection and the reflex neurotic manifestation. Here there was evidence of

correlation between two different portions of the respiratory apparatus, viz., the nasal and laryngeal. In those asthmas, the exciting cause of which is to be traced to nasal disease, the correlated tract is somewhat lower down, viz., in the trachea and bronchi, as indicated by the characteristic spasms.

The fact that cough often ensues on touching the nasal mucous membrane by probes, catheters, and instruments used for diagnostic purposes, led [30]John Mackenzie to conclude that many cases of cough might be of a nasal reflex character; he accordingly conducted a series of experiments with a view to testing the sensibility and relative irritability of the nasal lining in health and disease. As a result of these investigations, he concludes that there exists a well-defined sensitive area situated near the posterior extremity of the inferior turbinated bone and contiguous portion of the septum; stimulation of this area, either through a local pathological process or through the action of an irritant introduced from without, is 'capable of producing an excitation which finds its expression in a reflex act, or series of reflected phenomena,' of which the most common is nasal cough. Hack, however, considers that the most sensitive region is the anterior portion of the inferior meatus. Since the last edition I have lately had under my care upwards of twenty case of hyperæsthetic rhinitis (hay-fever and pseudo-hay-fever), in which the characteristic symptoms subsided on the removal by the nasal trephine of prominent sensitive spurs at the anterior part of the septum. In health this area only responds to some abnormal irritation, and its function is doubtless to warn the lower respiratory region of the approach of dangerous gases or other injurious agents. When, therefore, we are dealing with cases of cough, aphonia, laryngeal spasm, and asthma, it is our duty not only to examine the lungs and larynx in seeking for the cause of the symptom, but we must also explore the naso-pharynx and nares. And in case no obvious cause is found in these regions we must not forget to include the ear in our investigation. I have seen cases in which simple impaction of wax was the cause of distressing laryngeal symptoms.

Epileptiform neuroses, including vertigo, which we have already considered in relation to the larynx, occasionally, but more rarely, occur in connection with nasal disease. In the case of Mr. T., which has been related at page 487, a pinch of snuff, taken four or five years previously to my seeing him, had had the effect of causing him 'to drop dead down on the floor in a minute.' This had occurred once before in early life; but he had forgotten it on

the second occasion, until the circumstance of its repetition forcibly recalled it to his memory. Cases of nasal polypi causing this symptom are comparatively rare; but an Italian author, [31]De Gennaro, has recently reported one.

[32]Bobone, of Prazzi, has also lately called attention to a patient who suffered periodically from spasmodic attacks of sneezing of a most violent nature; on two occasions the attacks of sneezing followed so rapidly that the patient became cyanosed and collapsed, and almost died. With the supervention of vertigo, the attack was cut short. Examination of the nose showed a hypertrophic condition of the mucous membrane. The reflex symptoms disappeared on treating this, the local disease.

Here, no doubt, a reflex spasm of the glottis leads to vertigo in the way previously mentioned when speaking of the laryngeal analogue. Allusion has already been made to naso-pharyngeal catarrh as a predisposing cause of laryngismus stridulus, and the rationale of the connection is afforded by reflex as well as by direct cause.

A case of epilepsy, which was said to have been cured by treatment of a co-existent nasal affection, lately came under my notice. [33]Richardson and others have also reported similar examples. In most of these instances, antecedent epileptic proclivities were probably aggravated by the supervention of nasal irritation, and the cure of the latter merely removed a prominent exciting cause of the former; but others are very possibly analogous to the epileptiform seizures associated with laryngeal spasm. I have further knowledge of at least three cases of mania occuring in connection with nasal polypus. In one removal of the growth was followed by direct relief of the mental disorder, and the patient was discharged from the asylum to which he had been removed. This occurred in the practice of my colleague, Dr. Orwin, but two others happened recently in my own experience. In addition to the foregoing neuroses, which are now pretty generally recognised by specialists in this country and America as fairly often of nasal origin, there are others to which attention has been drawn by Continental observers, in a manner that may appear to savour of exaggeration. Thus Hack believes that megrim, supra-orbital neuralgia, diffuse headache, œdematous conditions of the nose and conjunctivæ, are almost *invariably nasal in origin*, and can be cured by galvano-caustic applications to the turbinated bodies.

The following case bears on these points:

Mrs. A., aged 51, consulted me, April 25, 1887, on account of intense occipital headache which extended to the shoulders, and was accompanied by a sensation of extreme cerebral fulness and pressure, and constant drowsiness. This condition had existed for four years, and had been exaggerated at the menstrual periods; but, though the catamænia had now ceased for a year, exacerbation still occurred at regularly recurring monthly epochs. I should have

been inclined to set down these symptoms as neurosal complications connected with the menopause, but that the patient reported also that for ten years she had been unable to blow the left nostril, that she had a feeling of numbness over the region of the nose, and that for the same period she had experienced great oppression whenever she was in a hot room, which was always relieved on her going into the open air. On examining the left nostril, multiple polypi were discovered in the middle meatus. These were removed, and the cautery afterwards applied. As a result, all the head symptoms have been relieved with a promptness and completeness that is hardly credible.

[34]Sommerbrodt, [35]Heryng, [36]Fraenkel, [37]Schäfer, and [38]Baratoux, have reported cases in support of Hack's views. The first two give instances of spasm of the glottis, which may be placed in the same category; while Hering and [39]Jacobi hold that some examples of chorea should be likewise included. [40]Bosworth takes an even more pronounced view than the observers whom I have quoted, and goes the length of saying 'that during the last four years he has seen no single case of spasmodic asthma in which the source of the disease could not be traced to the existence of some disease in the nasal cavity;' while in another recent contribution he will acknowledge no form of catarrhal laryngitis except as a result of nasal disease, and this not by continuity of tissue.

[41]Farquhar Matheson has drawn attention to the fact that stammering and stuttering frequently result reflexly from irritation in the nose and naso-pharynx. My personal experience confirms this connexion.

In addition to headache, which all rhinologists have been long familiar with in connection with nasal catarrh and stenosis, [42]Guye, of Amsterdam, two years ago, described another frequent symptom, namely, a condition of inability to fix the attention and hampering of the cerebral functions, which is especially marked in children with naso-pharyngeal obstructions. Guye has given the name of *aprosexia* to this condition, so common in the supposed victims of 'over-pressure.' [43]Hill confirms Guye's observations, especially as regards the disappearance of aprosexia on the removal of adenoid growths and enlarged faucial tonsils, and moreover has found that lymphoid tonsillar obstructions of the nose and throat are very prominent in the aprosexic, backward and idiotic children at Earlswood Asylum. [44]Spicer has also called attention to derangement of temper, energy, spirits, and intellectual power in connection with the same stenotic conditions. It is believed that aprosexia is due to lymph stasis and venous stagnation in the intra-cranial structures, especially in the frontal lobes, from the pressure of lymphoid hypertrophies in the nose and pharynx.

So early as 1881 [45]Guye mentions that Professor Snellen, struck by the frequent coincidence of the so-called *follicular conjunctivitis* with nasal and pharyngeal adenoid vegetations, thought it likely that the diseased state of the nasal mucosa might have an influence on the conjunctiva, either by producing irritation and lachrymation of the eye by reflex action, or perhaps through the direct connection of the lymphatic systems of both mucous membranes. Acting on this view, he had advised a young lady, aged fifteen, who, suffering from both these conditions, consulted him on account of her eyes, to undergo treatment for her throat and nose at the hands of Dr. Guye, prognosticating that when these were cured the eyes would get all right of themselves. Guye was sceptical of this prediction, but in the result its correctness was proved.

[46]Cheatham of Louisville has reported several cases of *diseases of the eye*, which he considered due to nasal reflex, and which have only been cured after successful treatment of the concomitant nasal lesion. This observer also states that 'certain cases of glaucoma have been relieved by stretching the nasal branch of the fifth nerve, and these cases might not improbably be the result of chronic nasal disease.' The following case in my practice is confirmatory of the suggestion ;

Mrs. D., aged 30, from Canada, when consulting me in the spring of 1885 regarding her daughter, told me that she herself was suffering from severe and increasing glaucoma, for which she had had the best advice in the Metropolis and on the Continent. Iridectomy had been performed on one eye, but without benefit. The pain was so intense that she was almost constantly applying cocaine to an extent that was seriously injuring her health. Early in 1886 this lady was attacked with double pneumonia, followed by asthma, for which she was treated in my absence from home by my colleague, Mr. Percy Jakins. On recovery, it was found that she was suffering from polypi in both nostrils; these I completely eradicated after some ten or twelve sittings. In July, 1886, she left England to reside in Jersey, and I did not see her again until quite recently (May, 1887). I was gratified to find that not only were her nostrils free from recurrence of the growth, and that she had had no return of her asthma, but that her eyes were entirely free from pain, and that her sight had greatly improved. This change in her ophthalmic symptoms had taken place without any further treatment of the eyes, and, as she herself suggested, had dated from the cure of her nasal disease.

A valuable contribution has recently been made on this subject of the connection of some eye affections with nasal disease by [47]A. Bronner, of Bradford, who, as practising rhinology as well as ophthalmology at a large hospital, is well qualified to form a correct opinion as to the prevalence of this connection. According to this observer, hypertrophic rhinitis and other abnormal conditions of the nasal mucosa proper (*i.e.*, excluding the lining of the sinuses) are frequent antecedents of epiphora, mucocele, inflammation of the conjunctiva and cornea, ulceration of these

same parts, granular lids, muscular asthenopia, and glaucoma. Many of these symptoms are due to stenosis, partial or complete, of the nasal duct. Suppurative catarrh of, and growths in, the antrum may in some cases cause dimness of vision and contracted field, orbital neuralgia, and glaucoma. That empyema and growths of the frontal sinuses may result in orbital symptoms has long been recognised on account of proximity. Some of these ocular and orbital complications of rhinal lesions are due to obstruction of the nasal duct, others to venous stagnation and congestion, others to abnormal reflexes. Of thirty-eight cases of mucocele reported by [48]Gruhn and thirty-five by [49]Faravelli de Kruch, the nose was also affected in thirty-six and thirty cases respectively. [50]Ziem has drawn attention to the fact that in most cases of granular lids there is also rhinitis, and believes the nasal lesion to be causal rather than casual.

I have heard it stated by ophthalmic surgeons that this intimate relationship of diseases of the eye and nose has been grossly exaggerated by rhinologists, but now that their attention has been drawn to it by so many independent observers, and recently by so distinguished an English specialist as [51]Henry Power, it behoves them to examine the nares in all those affections of the eye in which nasal disease is asserted to be even an occasional factor of causation.

The position taken by the generality of oculists on this question bears analogy to that assumed many years since by general physicians when the question of a primary pharyngeal or laryngeal tuberculosis was first mooted. The truth of such a circumstance, then denied, is now no longer disputed, even by those unfamiliar with the laryngoscope.

The question naturally arises—is an abnormal state of the nasal mucous membrane a *frequent* or only an *occasional factor* of these numerous and varied maladies? Before answering this question we must decide whether the fact of relief or cure by galvano-caustic applications *necessarily* implies that in the nasal condition we have a universal *fons et origo malorum*. Are not neurotic disturbances often benefited by strong counter-irritation, applied at the most diverse sites? [52]McBride, taking this line of argument, goes so far as to say that a galvano-caustic application to a healthy nasal membrane 'may act just as a counter-irritant of equal severity applied to another part of the body.'

Reviewing all the facts, we must acknowledge that in many instances asthma and other neuroses are excited by nasal lesions, and can be cured by galvano-cautery or other appropriate, and

not necessarily caustic, intra-nasal therapeutic agents. It is possible also that in a few instances galvano-caustic applications to the nose may relieve neurotic symptoms, not of direct nasal origin, by the inhibitory action known as counter-irritation, even where there is no marked nasal abnormality. But while personally inclined to agree with the view that a certain proportion of cases of asthma, megrim, epilepsy, and allied conditions, unassociated with *obvious* nasal lesions, may be cured by intra-nasal treatment, I am bound to say that in my own practice I have seen not a few instances of asthma, etc., which were apparently a direct result of existing nasal polypi, but in which the neurotic symptoms have continued in spite of complete restoration to health of the nasal mucous membrane. In such a case it is fair to suppose that although the peripheral nasal lesion was apparently an exciting agent of respiratory disturbance, the real disease was central in its origin, and probably due to lowered resistance or increased excitability of the medullary ganglia. In other words asthma is not in itself a nasal disease, although it may exhibit nasal complications, and may sometimes yield to intra-nasal treatment. [58]Schmiegelow, of Copenhagen, in a recent work of great merit, lays down some good rules with regard to the connection of the asthmatic phenomenon with the nose, which on the whole we have found to accord with our own experience. The connection may be assumed—(1) when the clinical picture leads to the belief that the abnormal condition of the nasal cavities is a factor in the production of the asthmatic attack, which is to be inferred when the asthmatic symptoms occur, or are aggravated with any increase in the nasal symptoms; (2) when local treatment, such as pencilling the nose with cocaine, the introduction of tampons of cocaine or menthol arrests the symptoms, or local treatment gives immediate relief; (3) when the careful treatment of peripheral irritation, due to a chronic nasal catarrh, definitely checks the asthmatic attack. At the same time, as Schmiegelow very properly remarks, 'nasal diseases may accidentally accompany cases of asthma without having any etiological connection with the asthmatic attacks.' It is best always to be very reserved in expressing anything to the patient as regards the influence local treatment may have upon the asthmatic attacks. Where the clinical picture gives us decided belief in a causal connection between the nose and the asthmatic phenomena, 'it is in these cases only when the patient himself wishes it, after he has vainly tried every other treatment, that one ought to begin the rhino-surgical treatment; but the result will probably be negative with

regard to the asthma, though it may otherwise do the patient some good by curing his nose.' An anonymous reviewer of this author's volume pertinently adds that only by carefully selecting the patients upon whom rhino-surgical treatment is really likely to be of service, shall we avoid the discredit of 'meddlesome surgery' and the reproach of Kurz, that in asthma one has to do with a real sufferer who is not merely an appendix to his nose.

It would serve no good purpose to enter at greater length into the varied reflex phenomena connected with either hyperæsthesia, hypertrophy, or hyper-stimulation of the nasal membrane; but it is an interesting fact to note that the *nasal reflex* has already been made use of in testing the local sensory action of drugs. Into one nostril of a frog the solution of the drug is introduced drop by drop, at intervals of a few minutes; the nasal reflex is then tested by passing a very light wire into the medicated nostril, and comparing it with the fellow of the opposite side. Irritation of this the sound side will cause a frog to blink, wince, and make efforts to remove the offending body. This method has been used to determine the local differences between caffeine and theine, and is very accurate and delicate; and the very nature of these experiments suggests the appropriate remedy for hyperæsthetic conditions of the pituitary membrane. From the first introduction of cocaine, I employed it for the relief of nasal reflexes, in common with many other surgeons, though the effect of the drug is not *always* anodyne. In my own person, cocaine applied to the nostril produces spasm, cough, and nausea. Where cocaine fails, atropine often succeeds.

The Accessory Cavities.—The frontal, sphenoidal, ethmoidal, and maxillary sinuses (Fig. XVIII., p. 34) require to be taken into account in studying nasal diseases. These cavities communicate by small openings with the nasal fossæ, and are lined by a mucous membrane similar in structure to that covering the respiratory area. *They probably serve as* **reservoirs** *of warm and moist air*, and thus aid in the respiratory function; doubtless, however, their original *raison d'être* was to afford lightness to the bony structures of the face. When their openings into the nasal fossæ are blocked by swelling of the membrane or by other mechanical causes, a retention of secretion results, which may end in abscess, or may lead to a chronic suppurative condition of the lining. I have long been in the habit of pointing out that *one-sided ozæna is most frequently* due to this circumstance, and [54]published record of the fact is to be found so far back as 1879. Suppuration of the accessory cavities, especially of the antrum,

is not, however, often of catarrhal origin, and is much more frequently connected with other causes, such as dental mischief, caries of a surrounding portion of bone, a missile, or other foreign body.

The **naso-pharynx** (Fig. XV., p. 29) is often the seat of various forms of catarrh, which are sometimes *primary*, and affect nasal, Eustachian, and adjoining regions by extension; or the inflammation may be *secondary* to disease in these latter regions, as when a suppurative catarrh of the middle ear or of the accessory sinuses discharges into the upper pharynx.

Many years ago Luschka, in describing the pharyngeal tonsil to be presently alluded to, drew attention to a depression or crypt situated usually towards the lower part of the tonsil, which was somewhat larger and more defined than neighbouring crypts, and which ended as a dilated extremity or pouch. This pouch, though not a constant structure, is frequently present, and has since been known as 'Luschka's bursa.' It is, no doubt, a vestige of the communication which exists during a portion of fœtal life between the pharynx and the hypophysis cerebri.

[55]Tornwaldt of Dantzig, who has made an extensive series of observations concerning catarrh of this pouch, regards it as a potent etiological factor in the production of post-nasal and Eustachian catarrh, pharyngitis, laryngitis, etc. In fact, he asserts that these bursal affections are to be found in so large a proportion as 20 per cent. of all diseases of the naso-pharynx. He also considers that this pharyngeal bursitis is often a sequel, not only of common catarrh, but also of scarlatina, variola, diphtheria, etc.

For my own part, I believe that the importance of this non-constant structure has been much exaggerated. For some time I have been endeavouring to confirm Tornwaldt's observations; but only *very occasionally* have I found any large catarrhal cavity into which I could insert a galvano-cautery point, this being the 'radical, active, and certain' treatment recommended by him.

The post-nasal space may be blocked by polypi, cysts, and hypertrophied turbinals projecting from the nasal cavities proper, or by fibroid and malignant tumours from the roof of the naso-pharyngeal area. But by far the most common affection is **hypertrophy of the pharyngeal or Luschka's tonsil** (Fig. LV., p. 86), to which [56]Meyer of Copenhagen first directed attention, and which, called by him **adenoid growths** or post-nasal vegetations, are now generally recognised under those terms.

This overgrowth of the normal adenoid tissue of the pharyngeal

vault is very frequently associated with enlargement of the faucial tonsil, with which it is analogous, and is usually met with between the periods of childhood or even infancy and adolescence. The symptoms to which it gives rise and its appropriate treatment will be considered at length in the next chapter.

Setting aside all theorizing, the following summary concisely represents the various circumstances, some symptomatic and some resultant, of the two great classes of nasal diseases, viz., hypertrophy and atrophy of the nasal structures, the first leading to obstruction, the second to undue patency of the choanæ, and both associated with disorders or abrogation of function.

In **obstruction of the nose and naso-pharynx**, any or all of the following objective characteristics may be observed, 1 to 6 being the most common :

1. *Mouth-breathing*, with the characteristic dropped jaw, and a *dry mouth* in the morning.
2. *A peculiar physiognomy*, due to pinched, collapsed, and dimpled alæ nasi, often associated with a wideness of the bridge of the nose, together with œdema and dilated veins about the root, the inner canthi being also drawn down.
3. Noisy respiration in the day and snoring at night. In some instances children wake up ' fighting for their breath.'
4. *Abnormalities of secretion*, occasionally complicated by lachrymation and epistaxis, and sometimes causing eczema narium and herpes. The secretions are only *exceptionally malodorous*.
5. *Vocal impairment*. This is either of the nature of want of resonance, deadness of speech, or inability to pronounce correctly the letters *m* and *n*, or to take the upper notes in singing. Associated with the foregoing may be included *vocal fatigue*.
6. Various morbid conditions of the *pharynx*, *larynx*, and *bronchi*, with sore throat, hoarseness, cough, and dyspnœa.
7. Many morbid conditions of the *ear*, including, according to some authorities, even deaf-mutism.
8. *Chest deformities*, accompanied by collapse of the apical or other portions of the lungs.
9. *Hernia*, from straining in efforts to free the nose from obstruction.
10. *Aprosexia*, inability to concentrate attention, backwardness and stupidity, with megrim, derangement of sleep, temper, spirits and energy ; melancholia.
11. *Sneezing* and *reflex neuroses*, including asthma, epilepsy, chorea, convulsions, stammering and stuttering, aphonia, whooping-cough.
12. Red nose, facial erysipelas, œdema of the nose and conjunctiva, glaucoma, and other eye lesions ; goitre ; lingual varix, globus.

Nasal Stenosis may be *subjectively* evidenced by many or even all of the following conditions :

1. A feeling of *stuffiness* in the nose and head, and occasionally, as in polypus, the sensation of a foreign body.
2. A sensation of *dryness* in the mouth and throat, especially on waking in the morning.
3. *Headache*, especially on mental application. In some cases there is frontal pain, accompanied by throbbing.
4. *Sore throat.*
5. *Anosmia, Parosmia,* and impairment of *taste.*
6. Disorders of *common sensation* (hyperæsthesia or anæsthesia).
7. *Asthenia*, with either *lassitude, restlessness, depression,* or loss of energy and spirits (aprosexia).
8. A feeling either of *chilliness* or *feverishness.*
9. *Deafness* and *tinnitus.*

In **atrophic conditions** there are usually present :

1. Diminished secretion and crusts on the mucous membrane.
2. Ozæna.
3. Exaggerated nasal respiration.
4. Wide alæ, with narial orifices markedly open and often nearly vertical, the tip of the nose being uptilted and the bridge frequently depressed.
5. Atrophic or dry catarrh of the pharynx, middle ear, and even larynx.

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CHAPTER XXV.

DIAGNOSIS AND TREATMENT OF INTRA-NASAL AND NASO-PHARYNGEAL DISEASES.

THE following may be taken as a good working classification of the various morbid conditions of the intra-nasal cavities; in the succeeding sections, to avoid reiteration, it is only approximately followed, and to some of the rarer diseases simple allusion is all that appears necessary. Those divisions printed in black type indicate the commoner groupings and those of greatest importance.

A. NASAL CAVITIES.

- I. Morbid conditions of the **mucous membrane.**
  - **Acute Rhinitis.**
    - *a.* **Simple,** or non-specific.
    - *b.* Specific—usually purulent—(in fevers, diphtheria, syphilis, gonorrhœa, glanders, etc.).
    - *c.* **Neurotic**—'hay-fever,' or *periodic hyperæsthetic rhinitis*, and pseudo hay-fever.
  - **Chronic Rhinitis.**
    - *a.* Simple.
    - *b.* **Hypertrophic**
      - **Simple.**
      - Specific (? Rhinoscleroma).
    - *c.* **Atrophic**
      - **Simple.**
      - Specific (**struma**, syphilis, tubercle, lupus, lepra).
    - *d.* Rhinitis Caseosa.
- II. Morbid conditions of the osteo-cartilaginous framework and **Septum.**
  - Hæmatoma.
  - Abscess.
  - Perforations.
    - Non-specific.
      - Fevers.
      - Syphilis
      - Struma.
      - Lupus.
      - Lepra.
    - Specific.
  - Narrowing.
  - **Deviations** and **Deformities.**
    - *a.* Developmental, etc.
    - *b.* Traumatic.
  - **Hypertrophies** or **Spurs.**
    - *a.* Cartilaginous.
    - *b.* Osteo-cartilaginous.
  - Necrosis and Caries.—Necrosing ethmoiditis.
  - Synostosis.

- III. **New growths** (whether of mucous membrane, bone, or cartilage).
  - Non-malignant (**Polypi**).
    - **Mucous**, myxoma.
    - Myxo-fibroma.
    - Fibroma.
  - Cystoma.
  - Papilloma.
  - Enchondroma
  - Osteoma.
  - Exostosis.
  - **Malignant** - - - -
    - Sarcoma.
    - Carcinoma.
- IV. **Epistaxis.**
- V. **Neuroses.**
  - Anosmia.
  - Parosmia, etc.
- VI. **Foreign Bodies.**
  - Physical :—Rhinoliths, etc.
  - Biological :—Larvæ, etc.

B. ACCESSORY CAVITIES, including

- **Antrum.**
- Frontal Sinuses.
- Ethmoidal Sinuses.
- Sphenoidal Sinuses.

(Catarrh. **Empyema.** New Growths, etc.)

C. NASO-PHARYNGEAL CAVITY.

- **Post-Nasal Catarrh.**—Bursitis.
- **Hypertrophy of Pharyngeal Tonsil.**—**Adenoids.** Fibromata, etc.

A. DISEASES OF THE NASAL CAVITIES.

I. MORBID CONDITIONS OF THE MUCOUS MEMBRANE.

ACUTE RHINITIS.

Acute rhinitis may be either of (*a*) a *simple*, non-specific nature; (*b*) of a *specific* variety, as when forming part of an exanthematous febrile attack; or (*c*) of a *neurotic* hyperæsthetic character, as in the conditions known as hay-fever and pseudo-hay-fever.

(*a*) **Simple rhinitis** may be acute or sub-acute. The former will be first considered.

Etiology.—Acute nasal catarrh is popularly, and probably correctly, associated with exposure to cold and sudden changes of temperature, the attack being often aggravated by the inhalation of irritating matters, such as dust and chemical vapours. Exceptionally, excessive heat causes acute catarrh in a neurotic subject. Amongst predisposing circumstances, youth, and the strumous, rheumatic and neurotic diatheses must be mentioned. Epidemic catarrh is rare in this country, and well-authenticated instances where one individual has 'caught' cold from another are rarer still. It will be generally found that such cases can be explained by reference to their exposure to similar conditions and environment, and especially to unsanitary surroundings.

Pathology.—Little remains to be added on this head to what has been laid down generally in the preceding chapter. Vaso-

motor dilation of the vessels leads to engorgement of the erectile cavernous tissue, and to increased activity of the serous, mucous, and lymphoid glands. The muco-serous secretion contains excess of leucocytes, some normal and others degenerating into pus cells, with shed epithelium (occasionally), a few red corpuscles, dust and molecular débris, and specimens of such micro-organisms as happen to be prevalent in the surrounding atmosphere.

Symptoms vary greatly in certain individuals, and also according to the exciting cause. The first onset is often characterized by irritation of the nostril and sneezing; these symptoms, indicating hyperæmia, are quickly followed by an increased flow of irritating secretion. Instead of mere sneezing, there may be fever, succeeded by a feeling of chilliness, and rarely, the first symptom may be a well-marked rigor. Headache and fulness, sometimes amounting to severe pain in the frontal region, quickly follow, with not infrequently heavy and even painful sensations in the muscles and joints. As the swelling of the rhinal mucous membrane, with its consequent uncomfortable obstruction to nasal respiration, increases, aprosexia supervenes. Then occurs a dry, and frequently sore, condition of the throat, due to enforced mouth-breathing. The paretic palate influences the articulation, giving the characteristic muffled nasal tone to the voice, which is usually altered also in phonetic quality by subacute changes in the larynx.

Lachrymation and deafness, the result of concomitant catarrh of the nasal duct, conjunctiva, and Eustachian tube, and eczema narium and redness of the tip of the nose from the irritating discharge, are frequent.

On dilation and illumination of the vestibule by **anterior rhinoscopy**, the mucous membrane is seen to be red and swollen; the redness, however, is not invariably present. The tumefaction of the 'baggy' inferior turbinated body can, in simple cases, be readily reduced by pressure, by application of a weak solution of cocaine, the sniffing of spirits of camphor or menthol, or by the mild application of any form of cautery, chemical or thermal; in this way erection due to acute catarrh can be differentiated from that of an old-standing hypertrophic rhinitis, which may moreover complicate it. The middle turbinated body will be seen touching the swollen septal mucous membrane, and this obliteration of the 'olfactory slit' so often observed is the cause of the anosmia. On **posterior rhinoscopic** examination, when feasible, flakes and plugs of mucus can often be made out in the neighbourhood of the Eustachian orifices, in Rosenmuller's fossa, in

Luschka's pouch, and in the choanæ. The posterior extremities of the turbinated bodies, especially of the inferior, will be evidently swollen, and will appear of a deep red colour, unless obscured by mucus. In young persons the pharyngeal tonsil will appear red and swollen.

PROGNOSIS is, as a rule, favourable. Extension to the accessory cavities of a non-specific nasal catarrh is rare; but when due to insanitary influences, or associated with acute infectious diseases, recovery may be long delayed, chronic catarrh may be engendered, and with it a tedious train of symptoms in the way of hypertrophies and neoplasms, atrophy, and ozæna.

TREATMENT need not occupy much space, because, although each year, scores of new remedies are suggested, there are but few that hold their reputation; and this for two reasons—first, that they are given *empirically*, and without the least regard to correction of the *predisposing* factor, or recognition of the *exciting* cause of an attack; and secondly, because, as a rule, they are commenced too late. The physician being seldom consulted at the time of an acute coryza, directions for treatment must therefore be largely prophylactic; and prescriptions for remedies, being often given in advance of recurrence, must necessarily be of a tentative character. The following is an epitome of my general advice in such cases:

1. **Prophylaxis.**—Exercise, Turkish baths, avoidance of draughts on the one hand, and of over-clothing, and especially of retention of such extra garments as cloaks and wrappers within doors, all suggest themselves. A light diet, especially at night, and a regular daily action of the bowels, are both measures to be regarded as of importance by the catarrhally disposed subject.

2. **Medical.**—*First Stage.*—For the relief of the premonitory irritation or fulness, anti-catarrhal smelling-salts (Form. 116), the use of the chloride of ammonium inhaler (p. 106), with or without addition of oxygenating ingredients (Form. 41), and the use of an oro-nasal inhaler with the inhalants in Form. 41, 52, and 53, are all and each of service, but I have for some time now used nothing but menthol, inhaled by the nares or applied by spray, brush, or inhaler, or where the inspiratory power of the nostrils is for the time actually abrogated, by light tampons of menthol-wool.

It may be convenient here to make some remarks in detail on the properties of this remarkable drug, to which I have so frequently alluded in other sections of this work.

Menthol, which is of the nature of camphor, exerts its action in the following manner:

1. It stimulates to contraction the capillary bloodvessels of the passages of the nose and throat, always dilated in the early stages of head-cold and influenza.
2. It arrests sneezing and rhinal flow.

3. It relieves, and indeed dissipates, pain and fulness of the head by its pain-killing and astringent properties, so well-known by its actions when applied externally to the brow in cases of *tic douloureux*.
4. It is powerfully germicide and antiseptic. It thus kills the microbe of infection in many specific fevers, even when unaccompanied by fever. It also prevents its dissemination.

The remedy may be employed by means of a general impregnation of its vapour through a room or house, or locally to the nostrils and air-passages ; for both which purposes there are several methods :

(*a*) A 10 to 20 per cent. solution of menthol in almond oil, in liquid vaseline, or in one of the many other odourless paraffin compounds, can be sprayed into the nose or throat, or about a room.

(*b*) By placing ten to twenty grains in an apparatus specially designed by Rosenberg for administering the drug in cases of laryngeal consumption by inhalation, in the form of vapour mingled with steam.

(*c*) By placing a similar amount or one or two drachms of the oily solution in a Lee's steam-draft inhaler, or bronchitis kettle.

(*d*) By a simple arrangement of placing a saucer of water containing a similar quantity of the crystals over a gas-burner in the hall, by means of which the whole house is kept constantly permeated with the drug during prevalence of an epidemic.

(*e*) But by far the most convenient method for personal use is to carry always the ingenious pocket menthol-inhaler known as Cushman's which should be used not only then but on the first approach of an attack of rhinitis, and several times a day, in cold-catching weather by those subject to head-colds.

The instrument consists of a glass cylinder, four inches in length, half an inch in diameter, and open at both ends. The tube contains crystals of menthol closely packed, and prevented from escape by perforated zinc and cork. The opening at one end is twice the size of the other, the larger being intended for inhalation by the mouth, the smaller for the nostril. The latter is the method which I by preference recommend. It is not to be simply smelt, but well sniffed or inhaled, so as to cause some tingling or smarting, a sensation which is quickly followed by that of coolness, and openness of the previously 'stuffed and heated nostril.

I may add that for all forms of nasal disease causing obstruction to the natural breath-way, I have for three or four years largely prescribed menthol by means of direct application or inhaler. By its use, when the nasal discharge is excessive, it is checked ; when deficient and thickened, as in hypertrophic rhinitis, its healthy character is restored ; and when arrested, inspissated and malodorous, as in atrophic rhinitis, fluidity is promoted and the foul smell corrected. In cases of acute rhinitis, catarrhal or hyperæsthetic, in which the nostrils are so blocked that nasal inhalation is impossible, relief, unattainable otherwise, is afforded by insertion of a lightly carded fragment of wool, medicated to the extent of 5 per cent. with menthol. The same method is serviceable in cases of atrophic rhinitis, in which it is desirable to modify the over-patency of the nostrils and at the same time to stimulate to healthy secretion. Menthol, by means of wool more powerfully impregnated, say to 10 or 20 per cent., can be usefully administered through an oro-nasal inhaler.

It is possible in many instances to cut short an attack at the first of an acute stage, and to avert the *second* by taking the mixture in Form. 88. The opium, which is thus administered only in its stimulating dose, contracts the capillaries ; and the belladonna, while it appears to diminish the constipating effect of the opium, assists by its specific action of inhibiting glandular secretion. Even after the second stage of coryza has been reached, this mixture

may arrest it; but if not, I do not advise further perseverance with drugs. Camphor internally has been very disappointing in my experience, although a concentrated spirituous solution sniffed through the nostrils is often effective; and as to the local treatment by snuffs of acacia, tragacanth, or bismuth, with morphia, I have never seen the least benefit from their use (see p. 127). My colleague, Dundas Grant, has recently devised a menthol snuff, which is, however, of not quite the same character as those to which I object, and I have seen good effects from its use. It consists of a mixture of menthol and powdered spermaceti in the proportion of 15 grains to the ounce. Ointments of cocaine or atropine, with vaseline, are valuable in the earlier stages, and also on cessation of the clear hyper-secretion, but useless during the period of excessive rhinal flow. Menthol in ointment or as a spray of an oily solution is preferable to cocaine. All these remedies act by causing a diminution in the capillary engorgement, and as a consequence in the amount of serous exosmosis. In a few instances Turkish baths are of service in the early stage. Sometimes, however, they only increase the symptoms and prolong the attack. The explanation of this untoward effect is that the heat excites capillary distension, while the transudation by the skin and the reaction after shampooing and douching are insufficient to restore the normal balance between the general vaso-motor control and the functions of the nasal passages.

Specific forms of acute coryza in relation to *gonorrhœa* require special measures which come mainly within the range of general surgery. It must not be forgotten that acute coryza in infants is often an indication of a *syphilitic* dyscrasia; and this especially when the discharge is **purulent**, as it is far more frequently with them than in the case of adults. *Insanitary surroundings* are also to be noted as not infrequently producing rhinitis of a purulent form in adults and also in children, especially those who are the subjects of lymphoid hypertrophies. The etiology of the neurotic disease, *hay-fever*, or what has been well termed by Sajous *periodic hyperæsthetic rhinitis*, has been already discussed in the previous chapter. Further consideration in relation to symptoms and treatment will be presently afforded.

The *treatment* of acute rhinitis complicating the *specific fevers*—especially *variola*, *scarlatina*, *measles* and *diphtheria*—is essentially the same as that of the more acute forms of the simple variety, but germicidal sprays or douches are more clearly indicated, and the same may be said of nasal manifestations in epidemic influenza, such as has been generally manifested during the past winter throughout Europe.

In *children*, and especially in *infants*, blocking of the nostrils by purulent discharge leads to distressful and even dangerous symptoms. It is far more often associated with adenoid growths in the naso-pharynx than is generally recognised. For its relief beyond removal of the exciting cause it is frequently necessary to syringe them two or three times daily with a solution of borax or of a compound mixture similar to that in Form. 78.

SUBACUTE RHINITIS.

This condition is comparatively rare, and, when present, more often calls for surgical than for medical treatment. The condition is of great importance in relation to its disposition, if not cured, to proceed to the formation of hypertrophies; in children of post-nasal adenoid vegetations, in adults of congestions and thickenings of the covering of the turbinated bones, especially the inferior and the middle, and of polypi.

Each of these subjects will occupy later consideration.

Rhinorrhœa is the form in which subacute rhinitis is generally manifested. It is not necessarily the result of an uncured acute 'cold,' or of a repetition of acute attacks, though there is usually a history of catarrhal predisposition. Cases are recorded in which many ounces and even pints of clear watery fluid have been discharged in the twenty-four hours for periods of many months—in one instance, of nearly two years. I have never had such an experience, but have seen several patients who suffered from a similar condition of only less serious grade. There is seldom any local sign beyond congestion of the membrane and soreness of the external nostril; but occasionally there is a polypus or other objective cause for the flow.

The following are notes of two cases that occur to me:

Case 1 was that of a lady, aged 38, who suffered from excessive nasal discharge, which had lasted some years, and greatly prostrated her. I could discover no cause for the condition, but she derived great benefit, and was ultimately cured, by use of the opium and belladonna mixture, with Turkish baths, and later a course of Donovan's solution with strychnia, and a sojourn at Harrogate.

Case 2—Mrs. T., aged 45, was sent me by Dr. Bastable, April 11, 1887, on account of irritation and smarting of the nostrils, with frequent sneezing and incessant running of clear fluid, which had existed since last September. The sense of smell had become diminished, and respiration through the left nostril was impossible. She suffered from constant hemicrania.

She stated that she had always been susceptible to cold. Her skin transpired freely, but the slightest draught of air would check the perspiration, and then she would sneeze and have an attack, sometimes of cold in the head, sometimes of bronchitis. She had been always sensitive to offensive smells, and had been rather subject to small, painful gatherings inside the nose. All these conditions had, however, somewhat improved in the last few years.

She dated her present condition from a night which she passed in Cologne last September, on her arrival from Wiesbaden. It had been a very hot day (97° F. in the shade), and she had arrived much fatigued. She was subjected to such offensive smells in the hotel that vomiting and diarrhœa supervened, and she was ill for some days. Since that time her nasal symptoms, as above detailed, had steadily increased. Life was described as simply intolerable.

On examination I found subacute inflammation of both nostrils, without other perceptible cause for her symptoms. Having anæsthetized the nares with cocaine, I freely applied galvano-cautery to both nostrils, and prescribed anterior nasal syringing (Form. 78), and ointment (Form. 80 and 81 in combination). There was an immediate improvement, which I am happy to say has become permanent.

NEUROTIC OR HYPERÆSTHETIC RHINITIS, INCLUDING HAY-FEVER AND PSEUDO-HAY-FEVER.

Sajous appropriately states that 'Periodic Hyperæsthetic Rhinitis may be defined as an affection characterized by periodical attacks of acute rhinitis, complicated sometimes with asthma, occurring as a result of a special susceptibility on the part of certain individuals to become influenced by certain substances, owing to a deranged state of the nerve centres. It manifests itself only provided the mucous membrane primarily affected in the course of an attack is in a state of hyperæsthesia, and when the irritating substances are present in the atmosphere.'

This condition, otherwise called *Summer catarrh*, *Rose-cold*, etc., requires for its development three factors:

1. A predisposing neurotic idiosyncrasy with debility of vaso-motor control.

2. A resulting chronic hyperæmia of the vascular tissues and hyperæsthesia of the nerve endings of the nasal passages.

3. An exciting agent, which varies with the individual and the locality. It may be the pollen of a grass, of a rose, or of other flower; or it may be certain noxious conditions of the atmosphere which are peculiar to certain seasons of the year and certain localities, and independent of any vegetable particles.

Periodic hyperæsthetic rhinitis, due to pollen and occurring during the summer, constitutes *true hay-fever;* that associated with any other exciting agent is better distinguished by the title of *pseudo-hay fever*.

Great credit is due to Blackley, of Manchester, for demonstrating, in 1873, the correctness of Elliotson's views, put forth in 1839, that true hay-fever is associated with the presence of pollen in the inspired air. In 1876, Beard, of New York, demonstrated the fact that there were *numerous other* exciting agents besides pollen, and he called attention to the marked neurotic element in hyperæsthetic rhinitis. Amongst other biological exciting agents it is necessary to say a few words concerning the presence of

infusoria in the nasal passages; Helmholtz, in 1869, himself a sufferer from periodic hyperæsthetic rhinitis, suggested that the disease was due to the presence of vibrios in the nasal passages, which exhibited periodical activity during the hay season. Under the term 'vibrios,' Helmholtz doubtless really wished to refer to certain ciliated animalculæ, belonging to the group Infusoria, which are sometimes found in active movement in the nasal secretions of sufferers from hyperæsthetic rhinitis. On the few occasions in which I have looked for these organisms in hay-fever and pseudo hay-fever patients, I have not succeeded in finding them; and they were only present, as far as could be ascertained, in the rhinal secretions of one out of eleven cases of hay-fever examined by Hill, in the summer of 1889. These organisms, independently observed, are apparently the same as those described by Salisbury, some ten years ago, as present in an American epidemic of influenza, and to which he gave the happy synonym

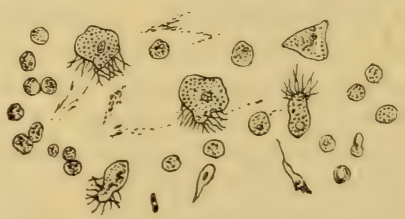


FIG. CXCV.—NASAL SECRETION FROM CASE OF HAY FEVER. MAGNIFIED ABOUT 600 DIAMETERS.

The specimen shews four ciliated *infusoria*, several leucocytes, a cell of pavement epithelium, and débris. At the foot of the drawing are represented a ciliated cell from the respiratory epithelium, and one of Schultze's spindle-shaped cells from the olfactory region.

of *infusorial catarrh*, calling the organism the *asthmatos ciliaris*. Elsberg confirmed the observation, and found similar infusoria in the secretions of those suffering from acute forms of hyperæsthetic rhinitis. The illustrations here given (Fig. CXCV.) are from the pencil of a medical student who was himself the subject of the trouble under consideration, as well as of sensitive spurs in each nostril.

It is not probable that the microbe thus described in connection with ordinary influenza, or with hay-fever, would be frequently present in those suffering from attacks of the nature of the recent epidemic of Russian influenza, a disease which gravely affects the nervous as well as the respiratory system; and the specific microbe of which, so far as present investigation shows, is claimed by some to be nearly identical with the bacillus or rather diplococcus of pneumonia: by others the microbe is held to be of a nature of a flagellate monad. Nevertheless, I have seen cases where, the

nasal symptoms preponderating, ciliated organisms such as those here figured were found in the secretions of those suffering from the epidemic.

Sensitive Areas.—Reference has already been made in the preceding chapter to 'sensitive areas,' on the inner surface of the inferior turbinated body as demonstrated by John Mackenzie and Häck. It must now be conceded that it is much too narrow a view to regard this region as the only sensitive one. Sajous has described three other hyperæsthetic areas, one situated on the outer wall of the nasal fossæ in front of the middle turbinal, and two on the mucous membrane of that body—the first of which is near its anterior, and the second near its posterior extremity. My own experience would point to the fact that on the septum, and especially over spurs and projections caused by deflections, there are acutely sensitive areas and that the situations thereof vary greatly in different cases. Some authors hold that there are separate sensitive areas corresponding to the acts of lachrymation and sneezing, and in addition to an 'asthma zone,' and a 'cough zone.' It is, however, contrary to my experience to believe that asthma is specially connected with hyperthesia or morbid lesions in the neighbourhood of the terminations of the nerve of Cotunnius—the naso-palatine branch of Meckel's ganglion. Woakes's statement that sneezing is often intimately associated with hyperæsthesia of the area supplied by the nasal branch of the ophthalmic is substantially correct, though sneezing is often a morbid result of hyperæsthetic septal spurs, or rather of contact of the spur with the middle turbinal. In like manner contact of the spur with the inferior turbinal may explain some cases of otherwise unaccountable paroxymal cough. I have one such case now under my care.

Too much trouble and patience cannot be taken to ascertain the existence of hyperæsthetic regions by means of the probe, since they are often the cause of otherwise unexplained cases of *paroxysmal sneezing*, *vertigo*, and other reflex symptoms, the successful treatment of which can only be attained by accurate cauterization of the hyper-sensitive sites.

Cases of hyperæsthetic rhinitis occurring in the winter as well as the summer, and to which the term 'pseudo hay-fever' has been applied, are not uncommon in my hospital and private practice, and such sufferers are often engaged in some dusty form of employment, though not invariably so. I have seen a few cases recently (March, 1890) which appeared to be directly consequent on attacks of epidemic influenza.

The following case of hyperæsthetic rhinitis, in which the presence of pollen proves a potent excitant in the summer, and dust a less powerful, though no less obvious, irritating agent at other seasons of the year, is recorded as a type of this class of case. The history is simply condensed from the patient's graphically written statement.

W. H. H., captain, R.N., æt. 43, came under my care in May, 1888, stating that he had suffered from hay-fever since two years of age, certainly as long as he can remember; entered the navy in June, 1859; suffered only slightly during a summer spent in Nova Scotia, although he assisted to 'make hay' more than once; whilst serving in Channel Squadron, from 1864 to 1866, noticed that the 'hay fever was modified by residence on board and avoidance of the shore.' When stationed at Portsmouth he later observed that he suffered severely on shore; the symptoms disappeared, however, twenty-four hours after leaving in a troopship for the Mediterranean, but on reaching the Gut of Gibraltar, where a strong east wind was blowing off land, he had a severe relapse. During a voyage round the world, in 1869 and 1870, though never quite free from catarrh, had no very inconvenient symptoms; even in the tropics, however, the nasal mucous membrane was *always* hyperæsthetic, and especially so during the months of June and July. Whenever he spent a summer in England he got asthma and had to go to the seaside. During service on the Australian station he always had hay-fever symptoms in Melbourne (a very dusty town in those days), but suffered scarcely at all in Tasmania. The attacks in the southern hemisphere were of a different and milder character to those experienced in England and France, asthma never being experienced south of the line, but only (modified) coryza. 'An ordinary attack begins with violent sneezing fits, great irritation and secretion from the eyes, very copious discharges from the nares, and irritation of the palate; as the inflammation extends to the throat, asthma and a most distressing cough supervenes, which remains after the other symptoms have disappeared.'

On examination, this patient had well-marked evidences of hyperæmia and hypertrophy of the inferior and middle turbinated bodies, but without any marked septal deviation or outgrowth. Application of the probe about half-way back in the inferior meatus produced violent sneezing and distress. The soft palate was paretic, and the uvula thickened and relaxed, and there also existed varix of the vessels of the base of the tongue, and hypertrophy of the lingual tonsil. Only the slightest evidences of pulmonary emphysema were to be detected, but the patient stated that when under the influence of an acute attack, his chest trouble was considerably aggravated. Galvano-caustic treatment to the various implicated regions with internal administration of phosphide of zinc, arsenic, and nux vomica ultimately resulted in a successful issue, the patient writing in December, 1888: 'I am, and have been, very well. I was in Wales from 2nd August to 6th September, during the whole time hay was making, and I certainly suffered less than I have ever done before in England.'

For the correct interpretation of the various symptoms, and a proper comprehension of the indications for scientific treatment, it cannot be too strongly urged that the predisposing factors are of overwhelmingly greater importance than the exciting. This is so, whether the local condition be that of the acute coryza and temporary nasal stenosis of hay-fever, or the asthma and other respiratory symptoms sometimes associated with them, and sometimes separately manifested. The nature of the predisponents has been indicated in the previous chapter. It remains to briefly enumerate

the chief symptoms of the malady, and to indicate the lines for rational therapy.

The SYMPTOMS are in the first instance those of *acute catarrh;* but they occur more suddenly, and are manifested much more severely; the sneezing, coryza, nasal stenosis, headache, and debility all being more acutely distressing than is observed in non-specific rhinitis. Added to these manifestations, there is excessive lachrymation, with conjunctivitis and effusion into the eyelids. Patients frequently complain of sore throat and of great irritation, sometimes of the nature of an incontrollable itching of the palate. Where the veins are engorged there is *pharyngeal tenesmus*, a condition in which all the symptoms of rectal tenesmus are accurately simulated. Pyrexia is of varying degree, and as a rule is less than in an ordinary acute cold in the head.

Beyond these catarrhal symptoms, and sometimes independent of them, or at least of far more distressing importance, occurs an asthma of acute and quite temporary character. This symptom differs from the same respiratory malady uncomplicated by the direct irritation of season, in that it is manifested in the day quite as frequently and as intensely as at night. It passes away without leaving any impress on the lung tissue, and does not recur until the return of the season favourable to an attack.

The TREATMENT of hay-fever until recently has been not only most irrational, but (if one may use such a term) cowardly. Instead of attacking the predisposing idiosyncrasy, or the local hyperæmia, the former has been accepted as inevitable, and the latter ignored: while as to the exciting irritant agent, it has been simply shut out. Confinement to the house, change of residence, plugging the nostrils with tampons of wool, the wearing of goggles and double-gauze veils, are measures of but little value in arresting an attack, and in no sense preventive of a recurrence. Nor are snuffs, whether containing morphia (as do those known as Ferrier's), or of boracic or salicylic acid, or with either of these *plus* capsicum (as advised by Mortimer Granville), any more useful than might be expected in consideration of the unphysiological character of the indications advanced by their advocates. My views on these questions are the result of a lengthened experience. They were set forth more fully in a paper on the treatment of hay-fever, which was published in the *British Medical Journal*, June 21, 1884.

The neurotic state, once recognised, is to be attacked on general principles by nerve tonics, electricity, general douches, massage,

and the like. On occurrence of an attack remedial measures are to be divided into (1) *palliative*, and (2) *radical*.

Palliative internal measures may be represented by the opium and belladonna mixture, or by large doses of quinine with or without hydrobromic acid, preceded by a purge.

Palliative local treatment includes the inunction of the nostrils and eyelids with ointments of vaseline with atropine. The use of the menthol inhaler or of an oro-nasal inhaler with the inhalant in Form. 41, or inhalations of the vapour of chloride of ammonium, in combination with various medicaments, such as ozonic ether, oil of eucalyptus or pine in alcohol, menthol, camphor, chloroform, or aldehyde. Anti-catarrhal smelling salts (Form. 116), the action of which is quite different from that of snuffs, are often of great value in hay-fever. They probably act by stimulating the capillaries to contraction. The comparatively new remedy, cocaine, has more than answered expectations in giving relief to the symptoms of hay-fever, and since its physiological action is to contract the capillaries of the lower turbinated bodies, its success has confirmed the views previously expressed, that the main predisposing factor of local importance was a general or local area of excessive vascularity in some portion of the nostrils. Cocaine may be administered in ointment, as a spray, or by introduction into the nostrils of pledgets of wool soaked in a solution. The dangers of persistent cocainism already insisted on (p. 147), are to be borne in mind and avoided.

Radical local treatment consists in destruction of any hyperplasiæ or polypi in the nostrils, or in reduction of its vascular supply by the careful application to any hyperæmic area of galvanocautery, or of some other caustic agent, of which may be named in their order of efficiency, chromic acid, fuming nitric acid, and glacial acetic acid. Preliminary to any of these applications, the membrane is to be anæsthetized by cocaine.

It is hardly necessary to mention that any other local cause of irritation, as a septal spur or deformity, a relaxed uvula, enlarged veins, or granulations at the back of the pharynx, should be looked for, and if present should be effectively removed, according to the lines laid down in the appropriate sections. Although I usually recommend adoption of these slight operative procedures either before an acute onset or after its subsidence, I have occasionally pursued them at the request of a patient on supervention of an attack. I have never seen any harm result therefrom, but on the contrary have generally succeeded in arresting the symptoms.

CHRONIC HYPERTROPHIC RHINITIS.

I have already in the previous chapter dwelt at some length on the etiology of simple hypertrophic rhinitis. I am in agreement with John Mackenzie in believing that it is the result of the frequently recurring erections associated with repeated acute and sub-acute attacks of catarrh. Amongst other occasional concomitant factors in the induction of hypertrophy of the nasal mucous membrane, may be mentioned, however, climatic conditions, living or working in dust-laden or other deleterious atmospheres and insanitary surroundings, tobacco smoking, and various constitutional states, including the (?) catarrhal, gouty, rheumatic, and scrofulous. The lesions may date from some specific fever. Bosworth recognises none of the above as factors of importance, but teaches that genuine hypertrophy is nearly always subsequent to anterior stenosis, due either to septal outgrowths and deformities—the commoner cause—or to collapse of the alæ and consequent narrowing of the anterior entrance to the nares; and he insists that repeated erection and consequent hypertrophy brought about through the frequently repeated act of hawking of thick phlegm from the posterior nares and naso-pharynx into the fauces, diminishes atmospheric pressure in the nasal cavities when there is anterior stenosis, and induces overgrowth of the mucosa. From statistics taken in the last nine months of the incompleted current year, of 1180 cases of nasal disease healed at the Central Throat and Ear Hospital; 547 patients are recorded as suffering from hypertrophic rhinitis, and of these 238 were the subject of very obvious deviations of the septum. While, therefore, I am quite prepared to admit that hypertrophic conditions of the nasal mucosa are in something like fifty per cent. of the number complicated by spurs and deviations of the septum, and while I am fully alive to the fact that part of the successful treatment of hypertrophic obstruction consists in remedying any marked septal deviation by operative measures, I am unable to accept the view that spurs are invariably present, or that they are an actual *cause* of hypertrophy without more cogent reasons, for in the cases so complicated the hypertrophy of the mucosa is very frequently greatest in the nostril which is least encroached on by the septal spur—that is, on the side with least anterior stenosis. It is still more difficult to prove that *very slight* deflections, or *very small non-sensitive* spurs have a causal relation to the affection under consideration. On the other hand, Bosworth's suction theory cannot be lightly dis-

missed, even though we may reject the paramount causative importance of spurs, which, after all, are by no means infrequently present in non-hypertrophic conditions. There is no gainsaying the fact that the alæ nasi are very frequently collapsed and dimpled, with paresis of the dilator muscles. Anyone who has had much to do with the treatment of nasal obstruction will admit that this collapse is often an obstinate and troublesome complication when all hypertrophies and growths have been successfully reduced; and in reference to this, Roughton has correctly pointed out that there is often present in such cases a constricting band in close proximity to the septum, exactly opposite the dimple, on the mucous wall of the ala, at a spot cutting off the vestibule from the choanæ. The approximation of this band to the septum disappears on the introduction of the speculum, and is doubtless on this account frequently overlooked. I shall allude later to my methods of treating this troublesome alar collapse.

The SYMPTOMS are those of nasal obstruction as already enumerated, and are both rhinal and remote. Clinically I am in the habit of dividing the symptoms into those which are commonly and those which are only occasionally or exceptionally present.

Amongst the **common** characteristic evidences are a feeling of stuffiness and inability to breathe freely through the nostrils; this is accompanied by the dry throat in the morning on waking, and the typical physiognomy of the mouth-breather; the voice is either muffled, toneless and hoarse, or exhibits a so-called nasal twang. There is nearly always in fully established cases some morbid condition of the contiguous air-passages, of which chronic pharyngitis, whether of the hypertrophic or atrophic form, elongated uvula, paretic velum, Eustachian obstruction, and chronic laryngitis are the most frequent. Of the non-constant or **occasional** symptoms, impairment of the functions of hearing, and of smell and of the appreciation of flavours are amongst the most marked. Headache, lassitude, and aprosexia, are sometimes complained of and are more often present. Prominent reflex neurotic symptoms, in spite of the amount that has been written of them, are decidedly rare results of ordinary hypertrophic rhinitis. Their connection with hyperæsthetic rhinitis has been insisted on. When reflexes are present, it is of importance to recognise their exciting cause.

Much difference of opinion appears to exist as regards the secretions. Thus whilst Sajous holds that they are increased, Bosworth teaches that they are diminished. It can with con-

fidence, however, be asserted that in hypertrophic catarrh the rhinal secretions are abnormal and modified; in many instances, but especially in the early stages, the fluids poured out are apparently increased in amount, later the watery constituents are diminished, and hence the nasal passages become blocked with thick mucus which the impaired ciliary action is incapable of speedily removing. It must be remembered that if there is much anterior stenosis, normal nasal respiration, involving the duty of saturating the inspired air with moisture, is in abeyance, so that although only the normal quantity of watery-fluid is actually poured out, there is excess in the choanæ; later, as hyperplasia in the deeper layers of the thickened mucous membrane proceeds, transudation of the watery and serous fluids diminishes, whilst the mucous glands are, to say the least, apparently not less active than in health. This relative increase in the mucin and solid constituents of the secretion gives rise to the accumulation in the accessory sinuses and choanæ, and together with collapse of the alæ explains the inability to satisfactorily blow and clear the nose, which is so often complained of; while the presence of mucous and muco-purulent accumulations at the back and sides of the pharynx, which can be accounted for in the same way, gives rise to characteristic hawking and hemming. This condition, known as post-nasal catarrh, may or may not be associated with morbid catarrhal changes in the naso-pharyngeal cavity. As regards the character of the secretions in hypertrophy, they always contain leucocytes, and on account of the stagnation in the nasal cavities the mucus sometimes assumes a muco-purulent, and more rarely a fœtid condition. Bosworth believes that fœtor of the breath in hypertrophic catarrh is always due to bad teeth, foul tongue or some such extra-nasal cause, but in my experience fœtor, usually quite distinct in character, from that occurring in atrophic rhinitis, occasionally results, as is also more rarely the case in polypus, from long-continued retention of mucus in the fossæ, and especially in the antrum and other accessory cavities.

Physical Examination.—On the outside the nose often appears thickened above, especially in the upper two-thirds; but this is frequently more apparent than real, on account of collapse of the alæ below, and this thickening is usually much more marked in the case of polypi than of hypertrophic rhinitis. On raising the tip of the nose with the thumb it is possible with a good reflected light to explore the vestibule, and ascertain whether the prominent constricting band forming the outer pillar of the slit

between the vestibule and choanæ is so approximated to the septum during ordinary respiration as to be in itself a factor in stenosis. On dilating with a speculum this slit is widened, and the nasal passages come more or less into view, according to the degree and site of the hypertrophy. If much secretion obstructs the view, a nasal spray or douche followed by gentle use of the pocket-handkerchief will be necessary.

The areas containing cavernous tissue are usually most and first affected. The thickening of the inferior turbinated body may be more marked at one or other extremity, or, as is usually the case, the whole of the body, including the underlying bone, is enlarged in its entire length, the prominence being most marked at its anterior end, where it not infrequently touches the septum, causing anterior stenosis. This swelling is usually red and globular, but may be moriform, and is quite unlike a polypus, from which, moreover, it can easily be further differentiated by determining its attachment with a probe. It only partly subsides under cocaine, but sufficiently to enable one to explore the middle turbinated body and meatus and the upper part of the septum. Behaviour under cocaine enables one to differentiate from catarrhal erection. Hypertrophy of the middle turbinated body is usually most marked at its lower edge. It differs in appearance from thickening of the mucosa of the septum and inferior turbinal, in that it is whitish, gelatinous, and translucent like a polypus, and hence often termed polypoid.

A thickening of the septal mucosa and the presence of osteo-cartilaginous spurs and deviations can readily be made out by anterior rhinoscopy and probing.

Posterior rhinoscopy usually reveals some swelling of the hinder extremities of the middle and inferior turbinals, and occasionally of the tubercle of the septum. The hypertrophy, however, is almost invariably most prominent at the hinder extremity of the inferior turbinated body. These swellings are of two kinds, viz., the red and fleshy-looking, and the whitish, gelatinous or polypoid. I think the latter are more frequent. They vary much in size, from that of a pea to that of a small walnut, and may entirely block the naso-pharynx. Most cases come under notice when the growth is about the size of a hazel-nut, as they then begin to affect the hearing. The surface may be likened to that of a mulberry in form and sometimes in colour; but reddish and also translucent globular swellings are by no means rare.

Prognosis.—The evil consequences of hypertrophic rhinitis are

those of nasal obstruction, detailed in the previous chapter. The prognosis is usually good as to reduction of the stenosis; but as regards the frequently concomitant symptom of deafness, much will depend on the length of duration of the morbid conditions of the middle ear.

TREATMENT.—Palliative medication, in the shape of douches, sprays, and medicated bougies, are of service in those conditions of subacute catarrhal erectile swelling following acute attacks, and which represent initial stages of hypertrophy; but when hypertrophic overgrowth of the layers of the mucosa is fully established it is mere waste of time to dally with such remedies; only surgical measures are likely to do any real good in relieving the obstruction. In the simpler cases of turbinated overgrowth, uncomplicated by septal deformities and mulberry-shaped excrescences, the reduction of tissue and relief of obstruction is best effected by some destructive cauterizing agent. The cautery should, if scientifically employed, attain two ends, viz., (*a*) the reduction of the superficial layers of the mucosa by the formation of a slough, and (*b*) the shrinking of the underlying vascular tissues by the formation of inflammatory adhesions to the periosteum.

In my own practice for this purpose, I employ the galvano-cautery. When there is a large hypertrophied inferior turbinated body, I am in the habit at the first sitting (after cocainizing the nasal cavities) of plunging a long and slender cautery-point into the cavernous tissues in a direction as near as possible close to and parallel with the inferior border of the bone. In moderate cases one or two such procedures suffice to secure the requisite reduction of the inferior turbinated swelling; but when the condition is very marked, little reducible under cocaine, and of long standing, it is necessary to make linear superficial cauterizations as well, especially along the inner and lower sides of the body. The anterior third of the inferior turbinal may be burnt at one sitting, the middle third a week after, and the operations, if more are necessary, repeated at similar intervals.

I rarely apply the electro-cautery to the posterior third of the turbinals. Hypertrophies in this site are more easily and, on account of the proximity of the Eustachian tube, much more safely reduced by means of a snare passed through the inferior meatus and adjusted to the excrescence by aid of a finger in the naso-pharynx. Large globular and also moriform enlargements of the anterior extremity of the inferior turbinated bodies are best removed by transfixion with a needle and then snared. Hypertrophies of the middle turbinated body are most safely snared,

being held in position for adjusting the loop by means of small hooks or fine forceps. If they are not satisfactorily reduced by these means the galvano-cautery may be employed; but I would warn younger members of the profession that it must be used at the upper part of the nasal cavities with considerable caution.

Many specialists, including some of my own colleagues, prefer to use chromic acid instead of the galvano-cautery in cases of middle turbinated hypertrophy; but acid cauteries, even if the healthy mucosa is protected by intra-nasal guards, require to be applied with care and discrimination, and are not used in my own practice.

Thickening of the mucous membrane of the septum can be reduced by cauterization, but this remedy is seldom required. On the other hand, the rectification by saws, trephines, and other surgical means of osseous and cartilaginous septal deformities and spurs, which are so frequently present and complicate obstructive hypertrophic rhinitis, is a measure to which I attach the very greatest importance. The treatment of these complications is fully given in a succeeding section. Solid bougies are not used so frequently by me as by some surgeons, except after operations on the septum, in which cases I prefer the nasal vulcanite tubes suggested by Dundas Grant. When the treatment by cautery and the rectification of septal deformities fails to properly relieve the obstruction, attempts at gradual dilatation by vulcanite bougies have been in my experience more or less disappointing; but quite recently I have had most encouraging results from the use of gelatine bougies formed on a rigid nucleus of wire and medicated with iodol, chloride of zinc, etc. I have been led to employ them from the reports of the success Mr. Hurry Fenwick has had by similar treatment of urethral stricture. In some cases of hypertrophic rhinitis, as well as in many of polypi, collapse of the nostrils remains as a more or less permanent cause of trouble after the original malady has been removed. For relief of this condition stimulant smelling-salts, menthol inhalations, and menthol-wool are all effective. These failing, or as supplementary to them, I advise gymnastic exercise of the nasal dilator muscles, and once or twice I have found it necessary to resort to faradism. If unrelieved all the former symptoms are liable to recur.

RHINOSCLEROMA.

This rare disease, which may be considered a **specific** hypertrophy, and is not limited to the nose, requires only a passing mention as it is not prevalent in Britain; for there are but three

reported cases seen in this country, one being that of a boy of fourteen, a native of Guatemala (Semon), the others of a brother and sister, also of foreign nationality (Robertson). The morbid condition consists essentially in a round-celled infiltration of the corium of the skin which appears at the anterior nares, spreading first of all to the alæ and to the lips; it may afterwards invade the submucosa of the nasal lining, soft palate, pharynx, and larynx. The over-lying epithelium appears smooth and shining, and there is no tendency to ulceration. To the touch the lesion feels like a hard cartilaginous plate or plates; there is no pain, with the exception of a slight tenderness on pressure. Various microbes have been described as present in the infiltrated areas, and Stepanow and Nikiforow claim to have reproduced the disease in animals from culture of a bacillus, which they regard as *specific*. In every case, with one doubtful exception, in which surgical measures aiming at eradication have been tried, the disease has recurred; as, however, it does not invade the bones, the only treatment advisable is to combat the tendency to the production of nasal, pharyngeal, and laryngeal stenosis by appropriate operative procedures—tracheotomy, for instance, has more than once been necessary. Internal medication would appear to be useless.

ATROPHIC RHINITIS.

Varieties: Simple, or non-fœtid, and specific, or fœtid.

The literature of atrophic rhinitis is so voluminous that I shall avoid as much as possible quoting authorities, and shall content myself with stating those views which after long observation I have adopted as nearest the truth.

The terms atrophic and dry rhinitis, implying as they do desiccation and shrinking of the nasal mucosa, have been used by many writers as synonymous with onæza. Tubercular and syphilitic diseases of the nose, with fœtid symptoms, have also been spoken of as ozæna. Ozæna is, however, but a symptom, *frequent* and indeed almost constant in atrophic rhinitis; *occasional*, or rather very infrequent in hypertrophic rhinitis; both non-ulcerative diseases; *invariable* in the case of ulcerative—syphilitic and tubercular—diseases of the nose. I here restrict the term atrophic rhinitis to a dry, non-ulcerative shrinking process of the mucous membrane and spongy bones, characterized by abnormal roominess and patency of the choanæ, diminished secretion, the formation of crusts, and in most cases by fœtor, the last manifested at a varying period of the disease.

Etiology and Pathology.—The atrophy of the mucosa is seen histologically to consist in a change in the epithelium from a ciliated to a horny variety, in almost complete atrophy of the serous and mucous glands and of the lymphoid masses, and in cirrhosis of the other constituents of the submucous layer; there is also marked thickening of the walls of the vessels and shrinking of the erectile tissues. These changes can be readily made out, and on this head most observers are in substantial agreement, but not so as regards the cause of these changes; here opinions are of the most diversified description.

In the preceding chapter I have pointed out that hypertrophy is sometimes the antecedent of atrophy, but numbers of cases pass into an atrophic condition without having undergone an hypertrophic stage. Morell Mackenzie probably represents a large consensus of opinion when he writes, 'Atrophy appears to be always a secondary affection.' My own notion, however, is that atrophy is often primary, in the sense of not being secondary to any previous pathological process *in the nose*, although in such cases I am the first to admit that the pathological change is really due to a morbid diathetic state of the system (associated possibly with irritation from particles in an insanitary atmosphere). This, however, is not what Mackenzie means, for he is distinctly of opinion that the disease is not constitutional, and therefore not secondary in this sense. I have satisfied myself in a number of instances that, in addition to a predisposing constitutional weakness, which is usually strumous in character, two other factors have been present as excitants, viz., abnormal patency of the anterior nares with an upturned condition of the nose, and the pretty constant inhalation of an insanitary atmosphere. As regards the patency of the nostril in ozænic patients, the nose is nearly always tilted at the tip, not from any morbid process in the septum, as is seen in ulcerative syphilitic diseases, but as a congenital feature; the anterior aperture of the nostril, instead of looking almost directly downwards, looks more or less forwards, thus allowing the air-current to pass directly into the inferior meatus; at the same time this is favoured by the greater width of the nostrils, by the absence of vibrissæ, and by the wide condition of the isthmus between the vestibule and the choanæ, the usual constricting band being absent and the compressor naris paretic; in addition there is frequently manifested an abnormal activity of the dilator naris. These factors act most powerfully in causing the incoming air to pass straight through the inferior meatus to the pharynx, instead of passing over the middle and superior parts

of the nasal cavities; for it must be remembered that unless the air passes upwards, there will be little diffusion with the warmed and moistened air of the nasal reservoirs or accessory sinuses. The mucosa of the lower parts of the choanæ will be overworked and rendered more irritable to the particles of an insanitary atmosphere. Moreover, if there be any strumous or other constitutional vulnerability, the inability to recover from slight irritation will result in the destruction of cilia and in consequent stagnation and drying of secretion as the first step in the pathological process of so-called idiopathic atrophy.

As predisposing factors in the process must be mentioned age and sex. The disease is most prevalent in young adults of the female sex, and in many cases first becomes objectively evident to non-medical observers about the age of puberty, because the resulting ozæna is more marked at the menstrual periods. But not only is atrophic rhinitis to be found in individuals who, having arrived at puberty, are amenorrhaic, and in later years perhaps menorrhagic, but I have seen so many cases of the disease commencing in young children at the age of seven and eight, in whom the menstrual epoch has afterwards been abnormally delayed, that I cannot doubt the causal connection between wasting or non-development of the erectile tissues of the nasal fossæ and a similar condition of the female generative organs. I have also satisfied myself that there is much truth in J. N. Mackenzie's view as to the association of other kinds of sexual irritation as factors of nasal disease generally, and of the atrophic form in particular.

As regards secondary atrophic rhinitis, I have already explained how it occasionally follows simple non-fœtid hypertrophy. Cases of hypertrophic rhinitis which become complicated by fœtor probably invariably end in atrophy from the irritation of the essential ozænic factors, to be presently described. Atrophy is sometimes secondary to suppurative catarrh of the antrum from dental disease; most cases of unilateral ozæna are of this nature. In such a case it must be due to irritating emanations from the sinus diffusing with air in the choanæ. Ozæna, therefore, in conditions other than dry catarrh, causes atrophy, and, as previously stated, although dry or atrophic catarrh is not always accompanied by ozænic symptoms at an early stage, it is probable that such symptoms invariably supervene sooner or later.

I have up to this point avoided entering into the question of the cause of the ozæna. If we were dealing with a disease involving ulceration, and especially ulceration of bone (caries), it would be easy to understand the presence of a foul-smelling odour, but in

true, uncomplicated atrophic rhinitis there is no ulceration except such as is artificially produced in removing crusts; and the smell of caries, for instance, of the temporal bone, or vomer, is quite unlike the unique specific fœtor known as ozæna. Various explanations as to the cause of this peculiar fœtor have been suggested, of which the following only are worth considering: (1) It has been held to be due to suppurating discharges in the accessory sinuses; but this does not explain *why* this specific, unique odour should issue from the sinuses. Moreover, it is rarely that the smell of pus in the antrum and other sinuses is truly ozænic. (2) It has been considered due to the fatty degenerative changes which admittedly often take place in the cells of the racemose glands. (3) In recent times it was inevitable that an explanation would be sought for in the direction of fermentative changes, and in the life processes of micro-organisms. Both B. and E. Fränkel endeavoured to prove the latter point by examining plugs of cotton-wool which had remained in the nose for some hours after they had been introduced by Gottstein's method. They found a number of microbes present. Loewenberg and others have, however, pointed out that in such an experiment only an aëroscopic cultivation is made of the prevailing organisms in the atmosphere which happened to be present in the nose at the time. Such an experiment failed to prove *specificity*. Loewenberg, on the other hand, claims, as the result of his cultivation experiments from ozænic crusts, that the unique fœtor, so easily recognised yet hardly to be described, is invariably associated with the presence of a large diplococcus. He claims to have found it *always* present in the ozæna which occasionally accompanies hypertrophy, as well as in that of atrophy of the mucosa. He has never, after repeated cultivations, found it present in those simple forms of rhinitis in which ozænic fœtor has not yet appeared. He therefore claims that this large diplococcus is the specific cause of ozæna. In some recent cases which I have had bacteriologically examined for me, the organism has nearly always been found.

Whilst feeling strongly that all such advances in our knowledge as this must ultimately prove of some practical utility, I am bound to admit that the smell is so characteristic of itself that it is quite unnecessary for diagnostic purposes to look for the diplococcus, and Loewenberg's discovery, accepting the microbe to be the cause of the ozænic fœtor, brings us no further forward as regards treatment, for germicidal and deodorizing therapeutics have been adopted by anticipation for many years. Loewenberg believes that the diplococcus finds a favourable nidus before

ozæna is well marked, and that its discovery is of use in diagnosing those cases of hypertrophy which are likely to terminate in atrophy before fœtor has appeared. Proof of this is unfortunately just what is wanting at present, and such an authority on the nose as Bosworth does not believe that atrophy is ever a resulting sequela of hypertrophy, an opinion which is, however, quite contrary to my own experience. I have, for example, now under my care a case of such great hypertrophy of the left middle turbinal that it has displaced the septum and produced atrophy of the tissues on the right side, and simultaneous occurrence of the two is indeed quite common.

I am myself in the habit of differentiating the true ozænic odour from (1) the fœtor of pus met with in suppurative catarrh of the sinuses, especially in polypus and in hypertrophy; (2) from that due to decomposition of retained and inspissated secretions forming the crusts of atrophic rhinitis; and (3) from the smell associated with carious processes in the bone and cartilage in connection with syphilis, tuberculosis, and with various poisons causing loss of tissue of the rhinal structures.

Not only can these odours to my sense be distinctly differentiated, but their behaviour under the use of a deodorant douche constitutes a diagnostic point of almost unfailing constancy and of importance. (1) In the case of pus there will be no malodour for upwards of twenty-four hours after, and, moreover, the patient is made conscious of its reaccumulation by taste and nausea. (2) Thorough removal of crusts and free douching will render the subject of ozæna due to atrophic rhinitis quite fit for society, provided the process is unremittingly pursued twice every twenty-four hours, except perhaps at or near to the catamenial period, when it should be pursued more frequently, since at this time the stench is always more intense. The subject of atrophic rhinitis is, as a rule, unaware of the disagreeable character of the breath. Lastly when there is actual caries or necrosis, the deodorizing effect of irrigation is very evanescent, and the smell is not only more penetrating, but is also a constant factor of discomfort and distress to the patient.

TREATMENT is always tedious, and often most unsatisfactory; but I cannot admit that it is always hopeless, as is so generally asserted. The younger the patient the more likely is treatment to be successful. In cases which occur after the period of puberty, and as the probable result of a chronic hypertrophy of a pernicious blood supply, the sequel of a fever, the prospects of success are less encouraging.

Remedial measures that may be pursued by the patient are fourfold: (1) by syringing and spraying, to moisten the incrustations and retained secretions, never attempting to remove them by force or without such previous softening; (2) by further washing with anterior or posterior douches, to clear away the same; (3) by inunctions, to obviate the continuance of the dessication of the mucus and the re-formation of the scabs; (4) by modifying the undue patency of the nostrils and providing a substitute for the shrunken turbinals. With this view I have advantageously prescribed the insertion into the nostril of lightly-carded fragments of wool medicated with iodol or menthol. All of these remedies may be made to assist in a general antiseptic, detergent, or oxygen-generating process; and for this purpose several formulæ are appended.

The main point in treatment is to insist on the necessity of perseverance; it may even require to be pursued for the rest of the patient's life; and as individuals are seldom conscious of the offensive character of the breath, I always encourage them not to be averse to a reminder from friends and relatives when there is a relapse, so that renewed activity in remedies may be exercised. In any case douches and inunction should be employed night and morning, and occasionally at noon also. Beyond these local measures, the constitutional defects must be carefully combated by appropriate drugs, diet, and hygiene. Development of delayed menstrual function and correction of all causes of an excessive catamenial flow, are points to be never omitted in the treatment of ozæna in females. The constant galvanic current is serviceable in restoring tone, and has been claimed when applied locally to effect an absolute cure. Residence at Weston-super-Mare has proved of advantage in several children who have been educated there by my advice. The exhalations from the mud of the Channel in that district are said to be of value on account of its bromo-iodine constituents.

The question remains, Can the disease be cured? The answer lies in the view taken of the morbid process. Granted that when once the ciliated epithelium and vascular tissue are destroyed they cannot be replaced, and that therefore the normal character of the membrane can never be restored, much may be done to counterbalance this loss by stimulation to more active capillary circulation, and this especially where the diseased condition appears to be due to retrograde changes consequent on arrest of development rather than to actual atrophy. In no way can this desirable end be so effectually achieved as by occasional light

searings with the galvano-cautery, so as to set up active granulation. This process may be reinforced by stimulating inunctions, as of iodoform, iodol, or menthol. I am happy in the experience of many cases in which perseverance in such a course has been rewarded by a large measure of success, amounting, indeed, practically to a cure. It is true that in many cases the patient has been obliged to continue the employment of the douches and inunctions just indicated; but the chief and most distressing symptom—namely, the *ozæna*—has been thereby completely nullified, while the dryness of the throat, the deafness, headache, and digestive disorders have all been reduced to a minimum.

Atrophic Rhinitis depending on **syphilis** will be considered under the heading of perforation of the septum, while that arising as a result of either **lupus** or **lepra** has been alluded to in Chapter XX., which treats of those diseases in the regions of the throat. A few more words may be added.

Lupus.—The liability for the **nose** to be early attacked is explained by Hunt, in a recent paper of much original interest, to be due to its liability to abrasion during nasal catarrh, and for the same reason of greater susceptibility to trauma he attributes the preference of the uvula and epiglottis. This author thinks that in cases of nasal lupus the disease really originates often in the mucous membrane and spreads outwards to the skin—a point very difficult to settle. Moreover, there appears to be a proneness for lupus to attack by preference parts in which cartilage predominates. There is, however, but little doubt in my mind that though such may be the case in the rare instances in which the throat is attacked before the skin, the more usual sequence is for the mucous membrane to be invaded secondarily, and in my judgment this is simply by contiguity. There is little evidence to favour the view that it is conveyed any distance through the lymphatics, or by absorption. Hill has verbally suggested to me that the reason why lupus is so much more destructive of tissue in the alæ and septum of the nose, soft palate, epiglottis, ventricular bands, and, it may be added, of the ear, is that the ulceration spreading by continuity attacks the two opposite surfaces of these regions almost concurrently. The cases in which an invasion of lupus extends beyond the cartilage and attacks the nasal bones are so rare as to imply serious doubt whether it ever occurs except there be a co-added syphilitic history.

Lepra of the Nose is even more common than in the larynx, and, indeed, *epistaxis* is probably the first symptom that the mucous membrane of the upper air-passages is affected. Hillis,

who holds this opinion, has recorded one case in which 'the patient's nose bled long before he knew he was a leper.' In three-fourths of the cases tabulated by this observer more or less nasal disease was present. The actual conditions were very various, and comprised hyperæmia and infiltration of the mucous membrane, tuberculation of the turbinated bodies, destruction of the septum, and of the whole cartilages, and stenosis of the nasal orifices.

Tuberculosis may also be manifested in the nares, but there are no special grounds for separate remarks. It is but rarely if ever primary, and its local manifestations are best relieved by menthol in sprays, or unguents, and by other antiseptics or sedatives, administered by means of medicated wools, or by oro-nasal inhalers.

RHINITIS CASEOSA.

This is a curious nasal condition, in which, as the name implies, the upper part of the nasal choanæ are blocked by a caseous, putty-like material; it is found either in debilitated strumous subjects or as a sequence of polypi. As far as I am aware, no satisfactory account has been given of the pathology of this condition; it does not seem either like degenerated polypi or mucous membrane, but rather as a fatty, long-retained, morbid secretion, originating in the superior meatus, or in the frontal, ethmoidal and sphenoidal sinuses. Hill informs me that he has in five instances during the last three years observed the sphenoidal sinus nearly filled with this caseous material in dissection-room subjects of advanced years, in which no bone disease was evident. I have seen but three cases in the living subject who have applied for relief. The condition is an obstinate one, and usually associated in my experience with some caries of the ethmoid bone. Anosmia and headache are prominent symptoms, but, curiously enough, fœtor is not always marked.

TREATMENT.—I persistently, but carefully, scoop away the masses and curette the sphenoid and ethmoid cells, when such a procedure is possible. The coarse spray should be frequently used with some antiseptic lotion, and constitutional medication and a generous diet should never be omitted. The prognosis is favourable, if both surgeon and patient will persevere to complete eradication of the disease.

II. MORBID CONDITIONS OF THE OSTEO-CARTILAGINOUS FRAMEWORK AND SEPTUM.

Hæmatoma of the Septum is the result of traumatism, and may be either bilateral or unilateral, in my experience, generally the latter. There is frequently general œdema of the nose externally, with the swelling extending to the forehead and even to the lids and cheeks. The blood accumulates between the mucous membrane and the osteo-cartilaginous framework. It may be mistaken for polypus. If unrelieved by aspiration or incision, the blood-tumour is either gradually absorbed, or else it terminates in **Abscess of the Septum**. This latter condition is not, however, always preceded by hæmatoma, for traumatism may lead to carious conditions of the bone or cartilage, which go on to perforation and a symmetrical suppuration, in which case evacuation of pus is of course indicated. Hæmatoma may be confounded with a syphilitic gumma of the septum: such a cause should be suspected where there is no history of trauma, and appropriate local and constitutional treatment adopted, incisions being of course contra-indicated.

PERFORATIONS OF THE SEPTUM.

Perforations of the septum as part of the operative treatment of some forms of obstructive deviations are sometimes affected purposely, sometimes inadvertently. The small openings thus made are often productive of great relief to stenotic symptoms, are never followed by any destructive ulceration, and generally the patient, unless informed, is unaware of their existence. The time is now gone by when all perforations of the septum, excepting those of traumatic origin, are regarded as evidences of a syphilitic dyscrasia. **Syphilitic** perforation is probably always associated with necrosis of some portion of the ethmoid bone in addition to the perpendicular plate, and fœtor is never absent. It may commence as a gumma. The following two cases, which both came under my notice on the same day, at a recent visit to the hospital, are illustrations of this form of specific perforation in the adult.

Case 1.—M. B——, aged 50 (registered No. 76,350), presented herself at the hospital January 27, 1890, complaining of having suffered pain for the last year on the left side of the throat, especially on swallowing, and excessive purulent discharge from the nostril. Her voice was toneless and her articulation thick. On examination, the whole of the left side of the soft palate and a portion of the right was seen to have been destroyed by ulceration, and a large perforating ulcer existed at the situation of the left tonsil. The

septum nasi was perforated to the size of a threepenny-bit, and ulceration was still active. She had suffered from dimness of vision for three years, and was at present the subject of choroiditis of the left eye. It was elicited on further interrogation that of seven children, three had been born dead, two had survived but a few weeks, and the last two were living and comparatively healthy.

The eroding process was arrested by local galvano-cauterization to both septum and palate, the use of iodol ointment to the nose and chlorate of potash as a gargle to the throat, together with the internal administration of the biniodide of mercury.

CASE 2.—M. B——, aged 24, dressmaker (registered No. 76,341), applied on the same day as above, complaining only of pain in the nose, from which she had suffered for two years. On examination, the septum was found to be deviated to the left side and perforated by ulceration, which had evidently commenced on the right side and had extended through so as to produce ulceration of both the left inferior and left middle turbinated bodies. Although it was difficult to obtain an absolute 'specific' history in this case, the fact was elicited that there had been a suspicious skin eruption, loss of hair, and 'inflamed lumps' (nodes) on the shin bones. Improvement took place under the internal administration of biniodide of mercury and the local application of nitrate of silver, followed by ointment of iodol.

On the other hand, the perforations met with in **strumous** persons are usually limited to the triangular cartilage, and the erosive process shows no disposition to attack the bony septum. Such perforations frequently result from the practice, not only in children, but also in adults, of picking the nose; it is probable that the irritation which induces picking is caused by hairs, and by accumulations and crusts on slight spurs, so frequently the cause of epistaxis, and the process of erosion and hæmorrhage, thus set up, eventually leads to perforation of the triangular cartilage. These openings, though sometimes large, rarely give rise to deformity or falling in of the nose, which is rather the rule in syphilis, unless energetically treated at the initial stages.

CASE 3.—Dr. ——, aged 42, of the Army Medical Staff, consulted me in 1886 on account of a small perforation in the cartilaginous septum. He stated that he had always been subject to slight erosions and incrustations inside the nose. These he had picked away, with the result generally of causing slight hæmorrhage. While serving a few months ago in the Soudan, he perceived one morning that the septum had given way, and a small hole was formed which had since increased to its present size—a quarter of an inch in diameter. Ulceration had been for some time arrested. I advised simple inunction to prevent the further formation of crusts.

Another class of perforations are those resulting from **hæmorrhagic and debilitating illnesses**, and are not uncommon in those who have resided in India, or other hot climates.

Perforation from **chromic** acid and **phosphorus** poisoning, or from the virus of **malignant** types of **fevers**, is an acute process which rapidly destroys the cartilage, but only infrequently causes marked destruction of bone. Deformity is only an occasional result; and bone is never attacked, except in the case of syphilis or leprosy, and—*very rarely*—in that of lupus.

CASE 4.—A female, aged 24, came under my care early in 1887 at the hospital on account of a nasal perforation, which she stated had originated as a sequel of *variola*. Anti-syphilitic treatment, which she had undergone at the hands of another specialist, had only increased her suffering, and continual application of mercurial ointment had led to frequent epistaxis.

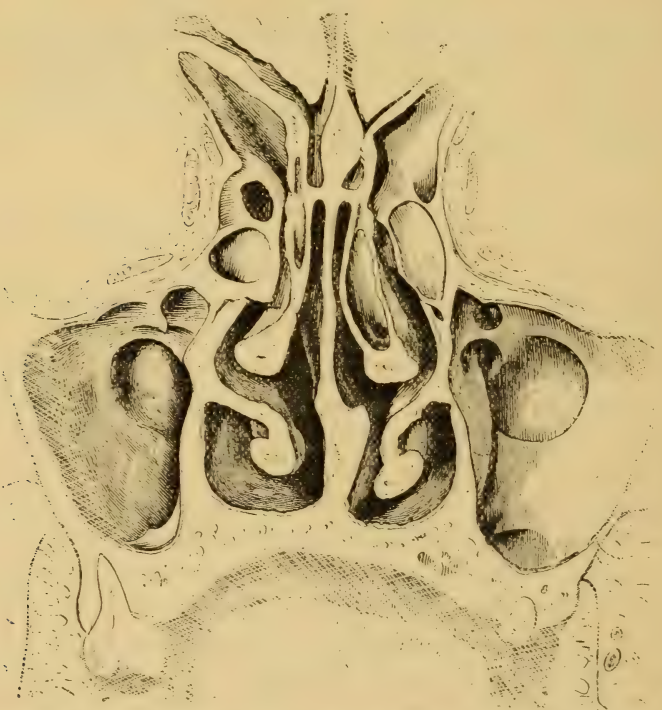
TREATMENT.—In addition to constitutional measures directed against any specific dyscrasia, and generous diet, energetic local medication in the shape of antiseptic sprays, and unguents or bougies of iodol or sozo-iodol with cocaine are indicated; and cessation of any habit likely to keep up irritation is to be rigorously enforced. The entire closing of a perforation by healing process is unknown in my experience, and it is doubtful if such a happy result ever occurs; but spontaneous or induced arrest of ulceration is the rule.

DEVIATIONS AND DEFORMITIES OF THE SEPTUM.

Independently of the seriously disfiguring external deformities that result from violent accidents to the nose, well-marked deflections and bony and cartilaginous outgrowths or spurs of the septum, to be seen only on internal examination, are exceedingly common, and constitute a generally unrecognised or unacknowledged cause of grave nasal trouble, or of a distressing reflex disturbance.

A perfectly symmetrical septum would appear, from the observations of Zuckerkandl, M. Mackenzie, and others, to be the exception rather than the rule. Thus, out of a total of 2,276 skulls examined by Mackenzie, Theile, Semeleder, and Harrison Allen, there was conspicuous deviation in about 75 per cent. In 370 crania inspected by Zuckerkandl, there were spurs or deflections in 140, that is, in 37·8 per cent.; whilst the proportion between symmetrical and asymmetrical septa in Europeans is as 1 to 3, but in the aborigines of Africa, America and Australasia it is as 4 to 1, a curious and somewhat significant fact. It must be understood that these statistics apply to deviations (of more than half a millimetre) of the bony septum, and do not include deformities of the cartilaginous septum. A large number, however, of the anterior spurs on which I have operated during the last few years, and of which I have kept records, were cartilaginous, and it is therefore evident that the numbers deducible from the examination of dried skulls understate the frequency of septal deviations. On the other hand, we have no extensive or reliable statistics *on a large scale* of the proportion of cases of septal deformity which cause symptoms requiring operative relief,

to the whole number of cases of nasal disease, and of the number of cases which are aggravated, but not actually caused, by the septal asymmetry. Of 200 cases of nasal obstruction tabulated by my colleague, Dundas Grant, there were septal deviations of such magnitude, position, or hyper-sensibility as to be considered the source of one or more symptoms in 33·5 per cent. These deviations were associated with hypertrophic rhinitis in 27·5 per cent., and uncomplicated in 6 per cent. of the whole number.



Drawing made from Specimen in Army Medical Museum, Washington. No. 2,347.

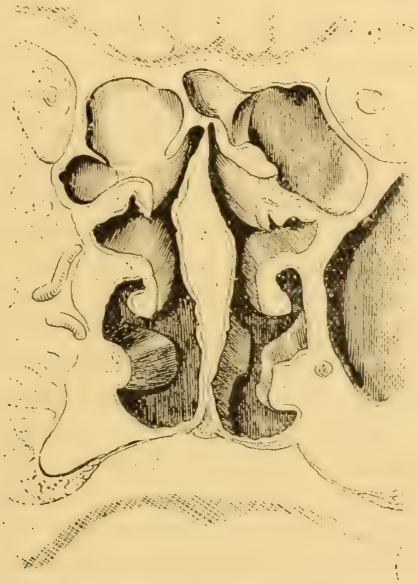
FIG. CXCVI. — CORONAL SECTION, showing septum deviated to the left, with osteo-ecchondrosis or spur (probably traumatic) ascending obliquely along upper vomerine suture. The outgrowth is most marked in the inferior meatus. On account of the slightly sigmoid character of the deviation, there is an enlargement of the right inferior and left middle meatus, with compensatory hypertrophy of their respective turbinals.

The left middle turbinated body has been sectionized so as to show its cavity: the antral cavities are seen to be somewhat asymmetrical.

As regards age, Zuckerkandl's statement that the septum is rarely deflected before the seventh year is at variance with older notions, though the fact that it is quoted without question by eminent authorities would appear to show that it is corroborated by clinical experience. Probably this immunity in early years of life can be readily explained on anatomical and physiological

grounds. Certainly the youngest case in which I have found it necessary to operate was that of a little boy eleven years of age, and his septal deviation was directly due to traumatism (fall from a wall) five years previously. The point is such an important one that further observations in other countries would be interesting, whether confirmatory or otherwise.

ETIOLOGY.—Numerous causes have been assigned as accounting for these deformities, excluding true fractures, which usually take place along the upper border of the vomer, and are due to marked



Drawing made from Specimen in Army Medical Museum, Washington. No. 2,348.

FIG. CXCVII.—CORONAL SECTION, made posteriorly to that of the preceding figure, through the lesser wings of the sphenoid. Here also is shown a sigmoid deviation, but the spur on the left side is somewhat obscured by shading. There is especially marked thickening of the perpendicular plate of the ethmoid. The openings of the upper ethmoidal cells are well shown, and the general asymmetry of the turbinated bodies, so commonly existing, is well demonstrated.

traumatism. Deviations with buttress-like spurs have been considered to be caused by such slight traumatic influences as using the handkerchief with the same hand and sleeping on a certain side, and a method of manipulative treatment to correct external deformity has been founded on this hypothesis.

The appearance of a deviated septum examined post-mortem almost irresistibly points to the conclusion that the deflected septum, unconnected with traumatism, is usually an overgrown septum; in other words, there is want of correlation between the growth of the septum and the rest of the bony framework. An

arched palate with deviation of the septum may be taken as an example of want of correlation in growth between various parts of the bony framework. In such a case a septum of normal growth and dimensions becomes deflected because a previous deviation, associated with earlier ossifications of the palatal processes of the maxillary and palatal bones, has reduced the vertical diameter of the nasal fossæ. A deviated septum is frequently to be seen in mouth-breathers at about the age of puberty, in association with adenoid growths and narrow, highly-arched palates. I am not in a position to speak definitely as to the causal connection of these complicated cases. Probably the palatal defect has predisposed to the glandular hypertrophy.

Deviations of the septum are often sigmoid in character, either in a horizontal, vertical, or oblique plane; further, the convexity of the deviation, especially when this presents a line of suture between bones or cartilage, is frequently increased by the throwing out of a cartilaginous, bony, or, more commonly, osteo-cartilaginous buttress or spur. Such spurs are usually present when a deflected septum gives rise to obstructive symptoms. Spurs do not necessarily arise opposite lines of suture, but such is generally the case. In my experience the commonest form needing operative interference is what Holbrook Curtis calls an ascending horizontal deviation and thickening, which passes along the suture of the upper border of the vomer with the triangular cartilage and with the perpendicular plate of the ethmoid. A horizontal spurred deviation is also frequent at the suture of the maxillary crest with the cartilage and with the lower border of the vomer. The form usually met with is a spur at the anterior part of the choanæ, composed chiefly of cartilage, which projects into and often closes the inferior meatus through contact with the inferior turbinated body. Vertical spurs are the rarest form, and are associated with deflections showing a sigmoid curve in the horizontal plane from before backwards.

Deflections, while causing stenosis of the meatus, into which they protrude, naturally increase the patency of the opposite side; but increase of function is apt to render the turbinated bodies on this open side liable to compensatory hypertrophy. This secondary overgrowth may take place to such an extent that stenosis will be produced, which will demand treatment; but it often happens that a deviated septum having been rectified, the compensatory hypertrophy of the turbinals of the opposite side will spontaneously undergo partial resolution.

Fracture may result in dislocation along the upper or lower

border of the vomer, the former being most usual and generally restricted to the anterior part. Fracture, however, greenstick or otherwise, with or without dislocation, may occur anywhere. The triangular cartilage is, of course, the part ordinarily displaced, and when this happens there is always internal and often, though not universally, external deformity also. My own experience enables me to entirely concur with those writers who believe that **traumatism is the most important factor in the production of septal deviations,** and any difference of opinion on this point may be at least partially explained by the circumstance that so many years often elapse between the injury and the development of symptoms which demand relief, that the primary cause is often forgotten, and will only be elicited by cross-examination. My case-book teems with records of such examples.

Symptoms (Objective).—External deformities, such as depression of the bridge and lateral deviations of the tip, are rarely marked except after violent injuries. Internal deformity is rendered evident on anterior and posterior rhinoscopic examination, and often on external and internal digital examination. Sometimes the full extent of the deviation only becomes evident after the reduction of erection by means of cocaine, or of hypertrophy and growths by the cautery, snare and other appropriate measures, or by the removal of an anterior spur. The position and consistence, as tested by probing, renders the diagnosis complete. With ordinary care, abscess and hæmatoma are unlikely to be mistaken.

Cases of deafness not infrequently come under notice in which it is exceedingly difficult to pass a Eustachian catheter on account of septal deviation, and many ingenious modifications of the instrument have been devised for overcoming the obstruction; but the circumstance has not yet received general recognition as indicative of a condition calling for surgical interference. Were such the case, it would often be found that rectification of the septum not only enables the catheter to be passed with ease, but in the majority of cases renders its further use unnecessary—in other words, the deafness and other aural symptoms are cured or greatly alleviated.

Associated with nasal stenosis due to septal deviation, as also in that which may arise from hypertrophic rhinitis, the pharynx and upper part of the larynx are unduly congested. Wherever the narrowing is considerable, varix of the root of the tongue and hypertrophy of the lingual tonsil, with the attendant symptoms of faucial and pharyngeal tenesmus, will also be noted.

Holbrook Curtis has quite recently (*Jour. of Amer. Med. Association*, Jan. 11, 1890) impressed upon the profession the causal relationship of *anæmia* and nasal stenosis, a circumstance that I have often noticed, and the importance of which I have frequently insisted on in practice. It is to be first observed that subjects of nasal obstruction, whether the cause thereof be cartilaginous deflection and spurs, intra-nasal polypi, or naso-pharyngeal hypertrophies, are always white-blooded. The actual deficiency of oxy-hæmoglobin in such subjects may be demonstrated by means of Hénocque's ingenious hæmatoscope, and Curtis has reported twenty cases in which the deficiency before operation was proved by means of this instrument to be reduced from the normal of 14 per cent. to as low as 5·5, and in one case to 3·5 per cent. After relief of the stenosis, improvement took place to the extent of a regain of oxy-hæmoglobin in some instances of even double the former diminished quantity. Spirometrical experiments and other measurements show corresponding deficiencies and improvements in the vital capacity, chest-girth, and weight. These facts are of supreme importance as to the possibility of this anæmia due to nasal stenosis being a predisponent to tubercle. *Cardiac depression* may also be explained on a similar hypothesis.

The SUBJECTIVE SYMPTOMS are those of unilateral or bilateral, partial or complete, nasal obstruction, and are, as previously mentioned, frequently complicated by chronic and hypertrophic catarrh, polypi, hay asthma, and other reflex phenomena. The functions of taste, smell, hearing, and voice-production are impaired. Headache and aprosexia, and any or many of the near and remote symptoms of nasal stenosis mentioned in the previous chapter, may be present.

TREATMENT.— When the deviation is due to traumatism, and is of the nature of a dislocation or fracture, much may be done if the condition comes under the notice of the surgeon at once. In cases of long standing, Adam's operation of refracturing the septum and supporting it in position by intra-nasal splints or bougies rarely results in very brilliant results as regards the deformity for which it is indicated, and to which it should be restricted. I have not myself encouraged such a severe procedure for external deformity alone. Nevertheless, it is rarely that such a case is uncomplicated by defects of function in the shape of anosmia, deafness, faulty voice-production, etc.

These can be effectually relieved by removal of the obstructing part of the septum by means of a nasal saw, or by a circular

trephine driven by a surgical engine or electro-motor. I know of no innovation in modern rhinological practice for the relief of (hard) nasal obstructions to which I am so much indebted as to Curtis's nasal trephines. Spurs of large size can be reduced at one sitting with little pain under cocaine. Any projections requiring further treatment may be removed with the small nasal saw. The hæmorrhage is sometimes considerable, but rarely alarming, and I have always been able to check it by either douching with hot water, or closely plugging the nostril with cotton-wool pledgets soaked in a 15 or 20 per cent. solution of cocaine or antipyrin. Some practitioners dilate the nasal passage at the same time, either with bougies or tubes, but these are seldom used by me for the first fourteen days. Nasal splints for correcting a sigmoid deflection of the cartilaginous septum in the adult are, in my experience, rather disappointing, and liable to set up painful inflammation. But in young children I have seen good results with Dundas Grant's instrument. Since I first witnessed Curtis operate by trephine on sixteen cases in one afternoon in the ordinary out-patient clinic of my hospital, I have given up treatment by cautery, incisions, or punches.

Bosworth claims to have only once perforated a septum in sawing operations, the number of which would appear in his practice to amount to thousands. Indeed, he made that statement seven years ago, and repeats it with all his increased experience in his quite recently published *magnum opus*. I can hardly believe that, dwelling so strongly as he does on the importance, in correction of a deformed septum, of achieving a perfectly smooth surface, that failure to entirely eradicate a spur would explain such a unique immunity to perforations. It is the personal opinion of many that not only is it often impossible in cases to correct a deviation, whether by trephine or saw, without perforating the partition, but that such a procedure is in some instances of sigmoid flexures the only means to bring about the restoration of a breath-way in both nostrils. Looking, moreover, to the comparative frequency of septal perforations, unassociated with any dyscrasiæ, caries, or necrosis, and their non-liability in such circumstances to cause deformity—a point correctly insisted on by Bosworth himself—one hardly sees why a perforation should be so much dreaded.

Hewetson of Leeds, recognising the fact that with cautery, saw, and snare we are in some instances forced to be content with only partially relieving an obstinate stenosis, boldly proceeds to rapidly dilate the nasal choanæ, under an anæsthetic, with a

powerful dilator, acting on the principle of a glove-stretcher. Hewetson has enlarged the nasal passages by these means in more than 300 cases with marked success, and without any

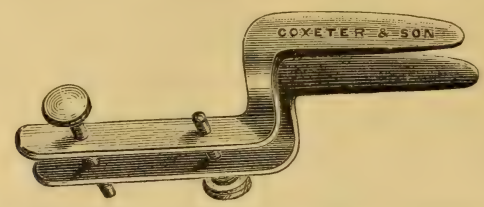


FIG. CXCVIII.—DUNDAS GRANT'S SPLINT FOR STRAIGHTENING DEFLECTIONS OF THE SEPTUM.

untoward incidents. I have now operated on over twenty cases in which no treatment short of a crushing dilatation would have been of much use in relieving obstruction, and the results have

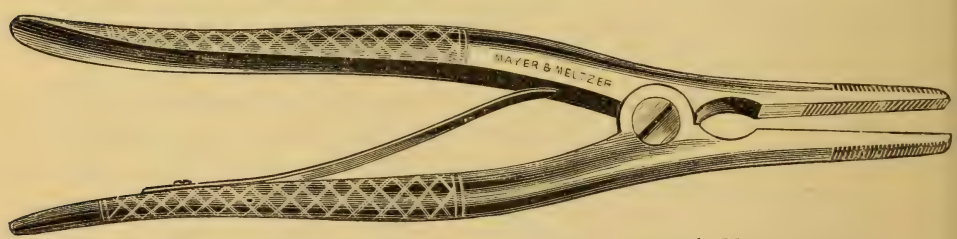


FIG. CXCIX.—HEWETSON'S NASAL DILATOR, WITH AUTHOR'S MODIFICATIONS. (*Half measurement.*)

The roughened ends prevent slipping, and the oval opening is made so that the instrument can be used as a straightener of septal displacement, which is sometimes an *immediate* result of forcible dilation.

been most gratifying. Amongst these are included many which had been imperfectly relieved by trephine and saw, but were cured by forcible dilatation. The crushing of the turbinated

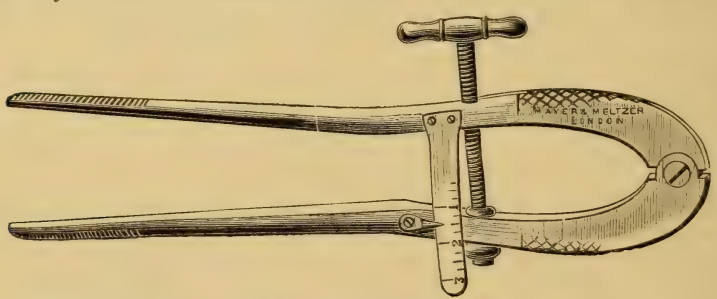


FIG. CC.—HILL'S NASAL DILATOR AND SEPTUM STRAIGHTENER. (*Half measurements.*)

bodies and bones and fracture of the outer wall of the nasal fossa, which must take place in some instances, appear to give rise to no troublesome symptoms.

Not the least of the merits of Hewetson's operation is that the constricting band, causing anterior stenosis by shutting off the vestibule from the choanæ, is by the nasal dilator forcibly stretched, and the entrance to the nasal chambers appreciably enlarged. If Grant's tubes, of a short pattern, be worn for a month or two after forcible dilation, the collapse of the alæ frequently disappears. In other cases further stimulating measures as mentioned in relation to hypertrophic rhinitis may be called for.

Hill has devised a modification of Hewetson's instrument, which possesses the combined principles of both Hewetson's dilators and Adams's septum straightener. The screw working on a measured scale is an original idea of decided value. I have ventured to add another slight improvement, in having both the outer and inner surface of the blades roughened. By this means in dilating the instrument is prevented from slipping, and in straightening of the septum, a firmer grip is obtained. I have also applied the same principle to Hewetson's instrument, with the result of making it more generally serviceable. Both these instruments might be bent on the same plane as Grant's straightener, so as to enable the surgeon to see better what he was doing with them.

The following cases, taken almost haphazard from the notes of my private practice, are briefly narrated for several reasons :

1. As examples of the most ordinarily witnessed varieties of deviations.
2. As indicating the nature of the symptoms usually present.
3. As illustrations of the frequency of traumatism as an etiological factor of deformity of the septum ; and of the length of time that often lapses between the accident and the resultant inconvenience.
4. To exemplify various methods of treatment.
5. And lastly, by pictorial illustration to give some idea of the appearances presented to view in anterior rhinoscopic examination.

With regard to these, it may be thought that because I have objected to anterior nasal diagrams for general use, on the ground that it is impossible, on any one conventional plan, to represent a full perspective of the receding nasal fossæ, these drawings are contradictory of that position; but in point of fact, my sketches aim only at giving a general and somewhat composite delineation of deflections of the nasal fossæ as looked at from the several points of view necessary for complete examination, this necessi-

tating visual inspection not only from the right and left of the middle line, but also in the separate axes of the superior middle and inferior choanæ.

It is important to note that all these drawings were made on cocainized patients, and for the most part represent actually *less* stenosis than really existed. In all the cases submitted to operation I have had the advantage of the co-operation of my colleague Mr. Jakins.

Case 1 (Fig. CCI.).—That of a medical friend practising in Lancashire, who consulted me in 1887. The drawing represents a very large septal spur almost completely obliterating the lumen of the inferior meatus, which is still further obstructed by hypertrophy of the inferior turbinated body. A small spur at the site of junction of the maxillary crest with the triangular cartilage is seen on the right side. The following is the patient's history in his own words: 'When 14 years old (I am now 46) I was kicked on the left side of the nose by an unshod ass, the immediate result was "two lovely black eyes," and a swollen nose; and it was soon afterwards noticed that my nose had altered its shape; but I felt little or no inconvenience till I was 26, when I found my nostrils stuffed up. I was said to have polypus, and an attempt was made to remove something with forceps. I suffered much pain, lost a bucketful of blood, but of course derived no benefit. Until I saw you I was still under the impression that I had polypus.

Fig. CCI.

'The *symptoms* are mainly those of discomfort when walking quickly, which occasions me to keep my mouth open, and makes me liable to get sore throat in very cold or dry weather. I have great irritation in the nostrils and back of the throat. Whilst in America, at the meeting of the Congress, the unusually dry character of the air produced an irritation which was distinctly painful. I am not only liable to head colds, but I think I have them more severely than any of my patients; my greatest discomfort, however, is at night, when after a short time the nostril of the side upon which I lie becomes so obstructed as to occasion change of attitude, and when I turn over I am obliged to breathe through the mouth for some time time before nasal respiration is restored. Restless nights are therefore very frequent. Sitting up, or on my back, I can generally breathe with my mouth closed. The *aural* trouble came on very gradually, in fact I was fairly deaf before I noticed it; there is, as you know, indrawing of the drum-head of both ears, due, I suppose, to unequal air-pressure. I do intend, with your kind help, to have done what you advise, but wait till "a more convenient season."'

Fig. CCII.

Case 2.—Dr. J. J. T., aged 35, practising in Wales, consulted me on account of extreme inconvenience arising from mouth-breathing, especially when rowing, running, or riding; he stated that twenty years previously he had had a blow on the nose from football on two separate occasions, first on one side and then on the other. He had had a severe fall on the face when he was 6 years of age. The drawing illustrates a double spur at the suture of the septum and the maxillary crest. The patient suffered also from varix of the veins at the base of the tongue, and stated that he always arose in the morning with some blood in the mouth, evidently from this situation.

Case 3.—Mrs. C. N., æt. 34, from Edinburgh, consulted me in October, 1888, on account of increasing tendency to nasal catarrh, dry throat in the morning, fatigue of voice after singing or reading, paroxymal cough, headache, and restless nights. I found the right inferior meatus blocked by a large spur, with general hypertrophy of the mucous membrane of this side; paresis of the soft palate and lingual varix were also present, and the mucous membrane of the larynx was congested and inclined to be thickened. The spur was *sawn* off as indicated by the dotted line in the diagram, and the other conditions treated at a later date by the galvano-cautery, sprays, etc., all with the most satisfactory result.

Fig. CCIII.

Case 4.—Master T, æt. 11½, from Gloucestershire, recommended to consult me by Dr. Sampson of Painswick, on account of mouth-breathing. His father was the subject of hypertrophic rhinitis, slight middle-ear deafness and a tendency to asthma. The history of the child was, that five years previously he had fallen from a wall, violent hæmorrhage occurred, and the nose was much swollen afterwards. On examination I found a sigmoid deviation and thickening of the septum as indicated in the figure, together with adenoid vegetations in the naso-pharynx.

Fig. CCIV.

These latter having been removed, the deviation, which was quite soft, was rectified by forcible straightening, the wearing of *Grant's splints* for several hours a day, and the plugging with medicated lint in the intervals. By these measures not only was natural breathing re-established, but a deformity which had threatened to become serious was corrected.

Case 5 is that of a lady, æt. 75, recommended to consult me by Dr. Bezley Thorne. Although the spurs delineated in the figure were the undoubted cause of considerable nasal distress and reflex respiratory irritation, having regard to her advanced age, I counselled only *palliative* treatment in the shape of iodol ointment and menthol inhalations.

Fig. CCV.

Case 6.—Mr. J., æt. 29, a solicitor, consulted me on the recommendation of Mr. Greig-Smith, of Bristol. He complained of deafness and tinnitus, weakness of voice, and especially fatigue on reading aloud long documents, dryness of mouth in the morning, and other symptoms of nasal stenosis. The drawing (Fig. CCVI.) represents an unusual amount of thickening and deviation of the septum, as well as polypoid hypertrophy of the turbinated mucosa.

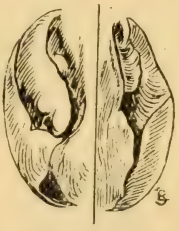


Fig. CCVI.

Case 7.—T. R. B., Commander, R.N., age 36, came under my care in May, 1887, on account of failure in resonance of voice and great hoarseness, and fatigue on the least exertion, so that it was almost impossible for him to give the word of command in tones that could be heard, and this to an extent that constituted a serious impediment to his professional career.

He also complained of constant dryness of the throat. Although he admitted that traumatism was probable he, could not remember any definite occasion on which he had received a blow on the nose. I found, in addition to a sigmoid flexion of the septum, a very considerable prominence amounting to a definite spur on the left side, and varix at the base of the tongue. The spur I *sawed* off and the varicose vessels were cauterized at a later date. The result of the treatment is best given in a letter received from the patient, July 22nd of the same year : 'I have not had the slightest trouble with my throat since I last saw you ; my voice is getting much stronger, my nose is well, and I feel sure that when you next see me you will be quite satisfied that the operation has been in every way a success.' This gentleman went through the manœuvres of 1888. After which experience he wrote : 'I am only now beginning to realize the amount of good you have done me. In spite of the filthy weather we have been having, and the lot of shouting I have had to go through, my throat has not given me the slightest bit of trouble, and my voice seems to be getting stronger and better every day.' He again served in the manœuvres of 1889 without any relapse, and quite recently expressed himself as feeling his throat stronger and better than it ever was before.

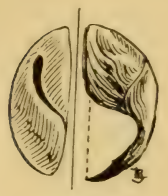


FIG. CCVII.

CASE 8.—Mr. W. M. J., æt. 40, a publican from Liverpool, sought advice in September, 1889, for the relief of post-nasal catarrh, which had existed for twelve years ; he remembered to have had a violent blow on the nose from cricket-ball at the age of 15. The figure (CCVIII.) shows a thickened deviation of the septum, evidently the result of fracture producing direct stenosis of the left choanæ. Stenosis on the right side was also present, the result largely of compensatory hypertrophy. The stenosis in this case was completely cured, and the symptoms relieved by means of *forcible nasal dilatation* with *Hewetson's instrument*.

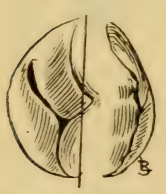


FIG. CCVIII.

CASE 9.—Rev. J. G., æt. 35, seven years in holy orders, consulted me on account of his voice continually failing him. Although not previously aware of it, he was utterly unable to breathe through the left nostril, and on being questioned remembered that he had had a severe blow on the left side of the nose nine years previously when playing at football at Cambridge. Fig. CCIX. shows a unilateral ascending deviation of the septum along the suture of the triangular cartilage, and the vomer completely blocking the left nostril, and on the right side there is a small spur at the junction of the triangular cartilage with the maxillary crest. Treatment consisted in *trephining* on both the right and left sides as indicated in the figure ; the operation on the left side was completed by means of the *saw*. The result was satisfactory above all expectation.

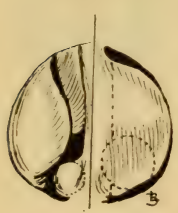


FIG. CCIX.

CASE 10.—Major T., age 48, retired from active service and superintending a Government department, consulted me on June 4th, 1888, on account of failure of voice, disturbed sleep through mouth-breathing, dry throat, fulness of head after a very short period of official occupation, in fact, of *aprosexia* in a marked degree. I found a spur on the right side, and a great general thickening of the septum on the left, the cause of which condition was attributed to having had his face trodden on when playing football nearly twenty years previously ; there was, however, no external disfiguration. The spur on the right side was sawn away, and the thickening on the left cauterized. On November 1st, 1888, he wrote : 'Since you took me in hand, I have been enjoying an amount of comfort such as I had not known for years, and shall ever feel sincerely grateful to you for it.'

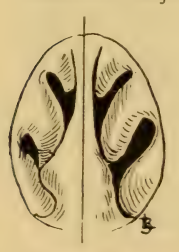


FIG. CCX.

CASE 11.—The Rev. W. S., an Irish priest, age 51, and a powerful man, measuring six feet five inches in height, and weighing 271 pounds, was seen by my friend Mr. Jakins in my absence in June, 1887, on account of failure of voice, which had existed eighteen months, with irritation and dryness of the throat. His breathing power was considerably impaired. His symptoms were explained by a relaxed condition of his soft palate, which was probably secondary to almost absolute obstruction of his left nostril, due to a somewhat bi-lobed septal ecchondroma. Traumatism, though highly probable on account of certain personal proclivities, was not inquired into. Relief by palliatives to the fauces was such that radical treatment was not adopted.

FIG. CCXI.

CASE 12.—Major P., age 38, consulted me in June, 1887, on account of general nasal discomfort and disturbed sleep, from which he had markedly suffered for two or three years. Though on inquiry it was found that nasal respiration had never been entirely free since he struck his nose by running against a wire fence on a dark night in the year 1874. On examination I found a large spur entirely obstructing the inferior breathway of the left nostril and a bi-lobed cartilaginous thickening on the right aspect of the septum.

The left nostril was treated by trephine and saw, the right by saw alone, as indicated by the dotted lines in the figure.

He made an excellent recovery, and was entirely relieved of all his distress.

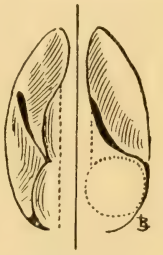


FIG. CCXII.

CASE 13.—Mr. F. H., age 39, retired officer from the army, consulted me with symptoms very similar to the last patient, and at about the same period of the year.

There was complete obstruction of the left nostril by reason of an antero-posterior sigmoid deviation of a highly thickened septum, and of the inferior meatus of the right by a distinct spur.

On inquiry it was found that he had had a very severe fall on his ace when skating on the ice twenty years ago, so much so that he had considerably injured his teeth, and, although his nose was much swollen at the time he was unaware that it had been permanently injured until his recent discomfort had brought the past to his memory.

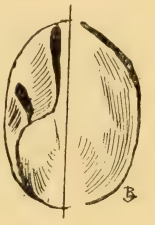


FIG. CCXIII.

This case was also treated by trephine on the right side, and trephine and saw on the left, with the result that the normal breathway was completely re-established, with corresponding disappearance of his distressing symptoms.

CASE 14.—J. M., clerk, age 31, consulted me at Easter, 1887, on account of hay-fever paroxysmal sneezing, and chronic post-nasal catarrh. There was no history of any previous injury.

He was the subject of chronic hypertrophic rhinitis, and an irregular-spurred deformity of the septum, partly bony and partly cartilaginous, and more pronounced on the left than on the right side. At the floor of the right inferior meatus was a small osteoma arising from the palatal process of the maxilla, to the importance of which I have drawn attention. Having rectified the left deviation of the septum by the saw, and trephined the small exostosis on the right side, cautery was, at a later period, applied to the middle and inferior turbinals, with the result that all the symptoms of

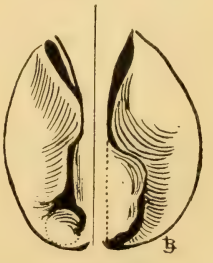


FIG. CCXIV.

hay-fever were quite relieved, and he passed the following summer with complete immunity from his former symptoms.

Case 15 is that of a lady of title, aged about 26, who, inheriting a disposition to middle-ear catarrh, consulted me in the autumn of 1887 on account of increasing deafness and tinnitus, with muffled voice, dry mouth on waking, and other symptoms of impaired nasal respiration. On examination there was found to be a sigmoid-shaped deviation of the septum, which was greatly thickened, and entirely obstructed the middle meatus, and partially the inferior of the left side, and the entire inferior meatus of the right side.

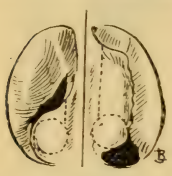


Fig. CCXV.

I operated on the left nostril by trephine and saw, in November, 1887, assisted by Mr. Jakins and Mr. Braine, administering chloroform. The only after-disturbance was rather severe neuralgia; but the recovery was good, and improvement on that side so complete that in the spring of the following year I was asked to operate on the right nostril. This I did also by trephine and saw, with the result that on December 3, 1889, I received a letter from her mother, saying that she had 'waited a little while to observe if the improvement in her daughter's hearing sustained itself, and was happy to report that it had done so, and had been remarked upon by several of her relations while visiting them.' This case is known also to Sir Oscar Clayton.

This lady has since married, and continues to hold the improvement I was able to afford her.

Case 16.—Mr. H., æt. 26, an officer in the Royal Engineers, consulted me in March, 1888, on account of headache, aprosexia of severe grade, dry throat, and other evidences of nasal obstruction. Hearing was unimpaired, but an almost constant tinnitus was complained of. The condition was attributed to an injury to the nose when at school.

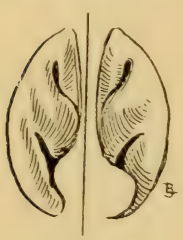


Fig. CCXVI.

Anterior rhinoscopic examination revealed the presence of double-spurred condition of the septum at the junction of the maxillary crest and cartilage. The middle and inferior turbinated bodies were hypertrophied and in contact with the septum, the whole causing very marked stenosis.

Under the influence of cocaine the left spur was removed by the trephine, the right with a saw. Quoting his own words:

'Before the operation I had no pain in my nose, but I could not breathe through the left nostril at all, it being blocked up by a hard growth of some sort. My breathing through the other nostril was only partially impaired by the same cause.

'I was hardly at all exhausted after the operation—in fact, I felt quite well until about two or three days afterwards, when I got a little headache, owing chiefly to lying in bed and being indoors, I think. The operation itself was exceedingly unpleasant, but after it was over the pain I suffered was very slight; but, of course, the discomfort from the plugs which were inserted was very great.

'My operation was done on Monday. On Thursday, I think, I came down to dinner, and went out on Saturday, but did not consider myself fit to do as usual, *i.e.*, take any violent exercise, for about a fortnight more. I can now breathe equally well through both nostrils, and am exceedingly glad I had the operation done. I also used to have headaches, and a dry throat on awaking in the morning, both of which have now gone.'

Case 17.—General T., æt. 53, retired from the Royal Engineers, came to me in May, 1888, very shortly after the patient whose case was last given; and, indeed, the letter

quoted was in response to inquiries of this gentleman. The history was that there had been a serious fall, leading to a broken nose, with permanent external disfigurement, and that for many years nasal respiration had been almost impossible, so that sleep had been most disturbed and discomfort constant. The case is interesting as being one of the few I have seen with manifest external deformity corresponding to the intra-nasal mischief, which consisted in this instance of a general thickening of the septum, much greater on the left and right side, the deviation being evidently the result of traumatic fracture.

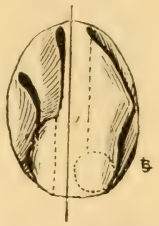


FIG. CCXVII.

The patient was operated upon, under an anæsthetic administered by Mr. Braine, by trephine and saw, as indicated in the figure. Relief was immediate; but the patient had to leave England for Canada before he was really well, and I did not see him again until the summer of 1889, when I found that there had been some inflammatory thickening, leading to some relapse of the symptoms. I destroyed the hypertrophic tissue by cautery, and afterwards enjoined the introduction of nasal bougies with iodol. Under this treatment the nasal breathway was completely and permanently re-established.

CASE 18.—Mr. G. B., æt. 43, consulted me in July, 1889, on account of snoring, disturbed sleep, and fulness of the head. I found a very congested pharynx, and, on examination of the nasal fossæ, a very considerable hypertrophy of the erectile tissue covering the septum, which was, however, somewhat reduced, especially on the right side, by application of cocaine. The patient was of gouty habit and a free liver. For this condition he was treated for some days, and I then applied the galvano-cautery to the situation of the overgrowth on two successive occasions, a week intervening between each. He was further treated with iodol ointment, and recommended to employ a menthol inhaler. Under these measures the hypertrophy was reduced and the symptoms almost entirely removed.

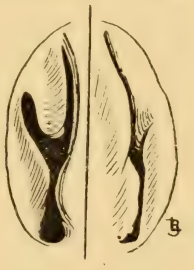


FIG. CCXVIII.

CASE 19.—Dr. R., æt. 60, consulted me in 1887 on account of constant irritation in the throat, bronchitis every winter, and general disposition to 'asthma' without any actual attack of that nature.

On examination I not only found chronic congestion of the pharyngeal and laryngeal mucous membrane, but, on anterior rhinoscopy, observed that he was the subject of an enormously thickened and deformed septum, the deviation having originally been of a sigmoid character. So distorted were the parts that there was some trouble in recognising the respective turbinals, and for the sake of elucidation they are indicated by letters in the illustration. With the probe was felt the condition described by Woakes as 'cleavage' of the middle turbinal, and the correctness of the explanation given of this phenomenon at page 599 was very clearly made out.

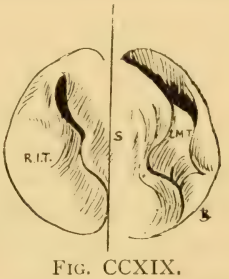


FIG. CCXIX.

This gentleman derived considerable relief from treatment of his pharyngeal condition by astringents, and the soft tissues of the nares were reduced by means of menthol, snuffs, and inhalations, and by iodol ointment. I had also prescribed chloride of ammonium and iodide of sodium. I did not advise operative treatment.

CASE 20.—Mr. M. G. C., aged 18, was seen by me on June 18, 1888, suffering from

Fig. CCXX.

toneless voice, headache, deafness in the left ear, and, during the last month or two, from tinnitus. On questions asked it was elicited that he had injured his nose by a fall from his pony when between four and five years of age. There was no external deformity. Anterior rhinoscopy showed a sigmoid flexure of the septum, with a large enchondroma blocking the left nostril anteriorly. This was treated by saw and trephine, and the deviation further rectified by the wearing of one of Grant's splints when the parts had healed. Politzer inflation was also employed to improve the hearing, and in the end an entirely successful result was obtained.

The **After-treatment** of all cases, irrespective of the exact kind of operation, consists in plugging with absorbent wool medicated with iodol, or sozo-iodol for the first week, after which application of iodol ointment twice a day, by means of a brush, is sufficient.

Douches should not be employed, unless there is hæmorrhage, for the first forty-eight hours, and then at low pressure. My syringe (Fig. LXXIV.), which contains only two ounces, and has several points of exit so as to form a kind of coarse spray, is both unobjectionable and effective. I generally employ a solution of the alkaline powder (Form. 78). The mucous membrane, where removed, is regenerated, and the wound heals usually within fourteen days. It is of the utmost importance to forewarn a patient that he must be prepared to give up so much time for rest at home. While it is difficult to over-estimate the amount of improvement to be gained by removal of septal obstruction in suitable cases, nothing is more likely to bring the operation into disrepute than an under-estimation of the mischief which might occur from want of care during convalescence.

NECROSIS AND CARIES.

Death of bone or cartilage is rare except in connection with certain dyscrasiæ, which are separately treated in these pages, but some remarks will be expected regarding the condition termed **necrosing ethmoiditis**, first introduced to the profession by Woakes some few years ago. According to this specialist an immense number of cases of necrosis of the middle turbinated portion of the ethmoid bone are seen by him yearly, and in very frequent association with this condition are found, as results, polypi and polypoid hypertrophies, together with hay-fever, asthma, and a host of other neuroses; most cases of polypi are said by him to be the result of necrosis of the middle turbinated bone. Surgical removal of the middle turbinated body is the treatment recom-

mended and carried out by its advocate. So far as I am aware, not a single practitioner of any experience, at home or abroad, has been able to confirm Woakes' observations. Necrosis of the ethmoid bone is a very rare affection, and usually the result of syphilis, but cases are very occasionally seen of enlargement of the middle turbinated body associated with polypi or polypoid hypertrophy of the mucous membrane, which, when tested with a probe, give the characteristic feeling associated with the probing of bones affected with osteitis and with osteophytic spicules in the periosteal region. This rare condition may in some instances be due to *ostitis granulosa*, described as occurring in the nose only, I believe, by MacDonald, who, however, as a pupil of Woakes, was so far from being impressed with the frequency of 'necrosing ethmoiditis in almost every case of hyperplasia involving the middle turbinated tissue,' that he is perhaps the only author who has considered the subject worthy of serious, though condemnatory, discussion. The uneven and worm-eaten-like surface of the normal turbinals—for the support of the cavernous erectile tissue—gives a sensation to a sharp probe very like carious bone. In five years I have only seen two cases which could be described as caries of the ethmoid bone which were not either syphilitic or malignant. From inquiries I have made I find that my experience is in accord with that of every otologist and rhinologist of note.

These very rare cases, especially if in association with polypi, are best treated by curetting the necrosing area with a spoon-shaped instrument, and then packing with iodol. Should this prove ineffectual, a larger or smaller portion can be removed by nasal bone forceps, or by the snare. I am not an advocate for removing the middle turbinal body in its entirety.

Woakes has also described '**cleavage**' of the middle turbinated body, and has figured such a condition in his work. The appearance of two vertical sausage-shaped bodies, with a cleft between them, situated in the middle turbinated area, is not really cleavage of the turbinal; for the inner of the two vertical bodies is the middle turbinal itself, and the outer body the prominent and hypertrophied bulla ethmoidalis. This interpretation of appearances exceptionally to be observed, which was originally supplied to me by Dundas Grant some years ago, is, I think, undoubtedly the correct one, and may be independently confirmed by anyone on inspection and probing. In corroboration thereof it may, moreover, be mentioned that *post-mortem* evidence of a cleft middle turbinal is altogether wanting.

Synostosis is a term I apply to a bony or cartilaginous bridge

which one occasionally sees extending from the bony septum to either the middle or inferior turbinal as a product of non-traumatic inflammation, and sometimes as an untoward result of cauterization or other intra-nasal operations, in which directions for further dilation by means of bougies or hollow nasal tubes have been neglected. When these adhesions cause obstruction, their removal by saw, trephine, etc., followed by careful dilation, is the treatment obviously indicated.

III. NEW GROWTHS, WHETHER OF MUCOUS MEMBRANE, BONE, OR CARTILAGE.

NASAL POLYPI, AND OTHER BENIGN GROWTHS.

These growths are of two kinds, the **myxomata** and the **fibromata**; for the sake of convenience other benign growths of the nares will be included in this section. Fibromata are, however, very rare, and moreover present symptoms and considerations for treatment of such an entirely different character, that the term polypus should, clinically speaking, be restricted to innocent mucous pedunculated growths. The word polypus is derived from the fancied resemblance to a zoöphite, and the appearance in the nostril has been compared to that of an oyster, and, on account of its translucency, to the pulp of a grape.

According to Zuckerkandl, in nearly half the cases examined by him *post-mortem*, the growths sprang from the mucous membrane bounding the hiatus semilunaris; and it is probable that in more than four-fifths of the cases they arise from, or near to, the middle turbinated body and bulla ethmoidalis. They are not infrequently present in the accessory cavities, notably that of the antrum. Although reported to be rare on the superior turbinated body and roof, I almost weekly remove small growths, which apparently arise above the middle turbinal, and therefore presumably from one of these upper sites. It is doubtful if true polypi ever arise from the septum, and in the few cases in which septal growths have been reported, they were probably, as in one observed by myself, of a warty (papillomatous) nature.

Growths of the inferior turbinated body rarely have slender peduncles; they have been already alluded to as moriform polypoid excrescences under the head of hypertrophic rhinitis, which they often complicate. They are, in my experience, seldom seen in conjunction with ordinary polypi.

Although polypi usually commence in one nostril, their presence in both is the rule in well-established cases. This fact will,

however, be only demonstrated on visual examination. Or perhaps the patient may only complain of unilateral obstruction in the first instance, and will not be conscious of disease in the opposite nostril until that in the first has been removed. Notwithstanding that polyps, when developed to moderate size, are always pedunculated, they most likely, as already pointed out, arise as sessile œdematous papillæ at dependent situations. I believe that this lymphatic œdema is usually the result of chronic catarrh, often hypertrophic in character, and in some instances complicated by obstructive septal spurs and deflections. Bosworth happily describes the mucous covering of the middle turbinal area in this condition as becoming 'water-soaked,' and teaches that subsequent pyriform growth is accounted for by anterior stenosis and suction action in hawking, sniffing, and nose-blowing efforts.

M. Mackenzie hesitates to accept catarrh as an important etiological factor on the ground that whereas polypi are rare before puberty, catarrh is common enough in early years. It must be remembered, however, that though profuse mucopurulent catarrh is common in children, true hypertrophic rhinitis and septal deviations, both of which lead to thickening of the epithelial and other layers and to diminished watery secretion, are decidedly rare in early life—at least, such is my experience. Nasal polypi are more frequent in the male sex, and may occur at almost any age. I have operated on patients as young as seven, and on one as old as eighty. The majority of my patients have been over thirty years of age.

Pathology.—Mucous polypi are generally covered with columnar ciliated epithelium, so long as the growths lie simply flopping about in the choanæ, but when projecting out of them anteriorly or posteriorly, the epithelium becomes much thickened —probably by friction—and assumes a stratified structure. The substance of the growth in such circumstances becomes more solid.

An ordinary polypus is composed of myxomatous or embryonic connective-tissue, with sellate cells and a large amount of intercellular substance containing much mucin. The amount of tubular gland-tissue present varies considerably; this may become atrophied or hypertrophied, and thus give to the polypus an adenomatous structure, or more rarely the glands give rise to small and even large cysts. Cystic degeneration is also sometimes said to be due to liquefaction of the myxomatous tissue. Nerves are not easily demonstrable, and the vessels are sparse except at

the peduncle, where doubtless the veins and lymphatics are more or less strangulated. The preponderance of afferent over efferent vessels explains rapidity and excessive serosity of the growth. It also explains excessive hæmorrhage on incomplete removal, and the tendency to recurrence unless the peduncular attachment is obliterated.

Symptoms.—The prominent symptom of polypus is partial or complete nasal stenosis, according as the obstruction is confined to the middle meatus or invades the inferior also. These symptoms are generally, but not always, bilateral. Stenosis will depend on the amount of accompanying alar collapse, hypertrophy, and septal deformity; it will vary according to the

Fig. CCXXI.—Mucous Polypus of the Nose.—This drawing of a polypus, taken intact from the left nostril of a young lady, æt. 24, by means of a wire loop passed from behind the soft palate, fairly well indicates the firmer myxo-fibromatous character of the growth, with ulceration of the portions (P) presenting at the back of the throat, and the friably mucous form of that (A) which had laid comparatively quiescent in the choanæ, and was visible by anterior rhinoscopy.

amount of moisture in the atmosphere. Bosworth actually doubts the hygroscopic properties of polypi. MacDonald's experiments, however, amply confirm the time-honoured evidence of daily clinical experience. Stuffiness is sometimes accompanied by the feeling of a moving body in the nose. Sneezing is, in my experience, non-constant, and indeed infrequent, though Bosworth holds that it is *par excellence the* symptom of polypus. Sneezing, when present, cannot be due to any acuteness of sensation on the part of the polypus, but must be ascribed to hyperæsthesia of the 'sensitive areas' of the mucosa proper.

Excessive secretion from the rest of the mucous membrane, due

to the stimulus of the polypus acting as a foreign body, is often marked. A purulent discharge generally indicates, I think, partial obstruction of the orifices of the accessory sinuses, which, if malodorous, further points to retention and decomposition. There is then occasionally a feeling of fulness of the sinuses. Lachrymation ensues when the nasal duct is pressed on or obstructed from concomitant catarrh. Mucous polypi never cause marked displacement of bones, though the bridge of the nose often appears widened, and pressure on the veins causes œdema at the root of the nose, with fulness of the vessels of the orbit and cranium.

Voltolini was one of the first to connect asthma and other reflex neuroses with the presence of nasal polypi. Headache and aprosexia are frequent. Any or all of the functions of smell, taste, hearing, voice-production, and even sight, may be impaired, the rationale of which results have been already explained. Pharyngitis, laryngitis, and bronchitis often constitute later complications of fully established mouth-breathing. The peculiar toneless, muffled voice and thick articulation are so characteristic as to give the lead to correct diagnosis on the first words of the patient.

Diagnosis is easy on account of the position, colour, shape, and mobility of the growths, as tested by inspection and probing. Fibromata are hard, sessile, and readily bleed. Mucous polypi cannot, with care, be mistaken for hypertrophy, or such rare growths as osteomata and enchondromata, or for a spur abscess, or hæmatoma of the septum. It would be a serious blunder to diagnose a polypus for a meningocele.

Prognosis.—There is no danger to life except in those rare instances in which polyps undergo sarcomatous degeneration. Such an event has been stated to be the result of repeated operation for recurrence, but I have never had or seen such a case. The tendency, however, is for all these growths to become more and more fibrous each time they reappear, constituting the myxofibroma of some authors. The result of treatment as regards the relief of symptoms, including the impairment of the special senses, is nearly always favourable. Hearing is generally improved, and further impairment prevented.

Asthma, in association with nasal polypi, is in a large number of cases absolutely cured by removal of the growths; but such a fortunate result cannot always be promised, and I know of no method which will enable one to give a differential prognostication on this head. Presumably those cases in which a reflex

asthma had longest existed would be those in which failure might be anticipated, on account of the long-standing cause, but I could quote many cases in opposition to this *à priori* deduction, as well as some in its support.

Regarding **recurrence**, I am careful to insist on the importance of immediate attention on the part of the patient to the slightest reappearance of symptoms, and on the removal of any new growth, however small, so soon as discovered. It is only by such co-operation of attention and perseverance on the part of surgeon and patient that a radical cure can be effected.

TREATMENT.—No doubt powders of alum or tannin temporarily reduce the size of polyps, and somewhat relieve nasal obstruction by depriving the polypi of some of their water, but such treatment has no other than a temporary anti-hygroscopic action. Caustic powders, used as snuffs, are, to say the least, dangerous. Caustic pastes or solutions, applied *secundem artem* to the base of a polypus when it can be clearly made out under proper rhinoscopic illumination, might be fairly safe in the hands of experts, who, however, usually select other means; but such measures are but too often blindly attempted by those unskilled in intranasal manipulations, with, it may be, the result of great ulcerative destruction of the olfactory and respiratory mucous membrane and only partial eradication of the growths. For this purpose chloride of iron, bichromate of potash, chloride of zinc, nitrate of silver, chromic and carbolic acids, have been from time to time recommended. Such methods I unhesitatingly condemn.

Much discussion has taken place over the time-honoured method of evulsion by forceps; here, again, much harm has over and over again been done to the inferior turbinated bodies, the ethmoid bone, septum, accessory sinuses, and nasal duct. With proper rhinoscopic examination and competent manipulation, such culpable accidents never occur. The growth is grasped as near as possible to the base, and forcibly torn or twisted from its attachments. By this method it sometimes happens that a portion of the ethmoid bone is removed along with the growth. While I agree with Bosworth in his dissent from M. Mackenzie's statement that such removal 'is not only justifiable, but oftentimes demanded,' I do not consider that such a circumstance is to be regarded as an accident of import, nor can I endorse Bosworth's objection on the ground that 'the origin of the tumour is not in the bone, but in the mucous membrane,' for without doubt it does frequently involve the periosteum.

Provided good illumination is employed, and the eye guides the

instrument, it is immaterial whether snares (Figs. XCVI. and XCVII., p. 140) or forceps (Figs. XCVIII. and XCIX.) be introduced. I myself now rarely use any other instrument than the cold wire snare, with forceps as an occasional adjuvant.

Some years ago I made a long-continued trial of the galvano-cautery snare-loop for removal of nasal polypi; but I came to the conclusion that the platinum wire required for this purpose was far less adaptable than the steel wire of the cold snare: also it was necessary to employ special hooks for securing the growth while the loop was adjusted (Fig. XCV., p. 139). It is true that steel loops are now used for cautery instead of platinum, but as they lose their temper and rigidity after once being heated to redness, the instrument has to be re-charged for each separate introduction—an altogether needless waste of time and trouble—for the vaunted superiority in regard to diminished pain, and especially diminished hæmorrhage, of the cautery over the cold steel loop has not been borne out in my experience.

M. Mackenzie lauds the ordinary galvano-caustic electrode used as a knife to cut through the pedicles. Such a method should be used with great caution in the upper meatus, even by an expert.

Prior to all operations at removal, cocaine should be employed, as recommended in the section on anæsthetics, page 146.

Hæmorrhage, although free at the time of operation with snare or forceps, is but seldom alarming, and decreases in proportion as the eradication is complete. It can generally be stopped by application of cocaine or antipyrin, in 10 to 20 per cent. solutions, on cotton-wool, or by a hot-water douche. I have observed that in those cases in which after-bleeding occurs to such an extent as to necessitate posterior plugging of the nostrils, the putrefactive changes which almost invariably follow reduce to a minimum the chances of recurrence of the growth.

The main point for cure of polypus consists not so much in the removal of the growth—nor, indeed, in the all-important complete eradication of the minutest visible polypus—as in the destruction of the soil and the bases of their origin, and in the cure of the catarrh, which, while an almost constant first cause, is also very frequently an obstinate sequel. So long as this catarrh exists, the fear of recurrence must always be present; and it is here that the value of the galvano-cautery is manifested as pre-eminent above all other forms of local treatment. It is my custom, long after every sign of polypus has been removed, to make weekly, or less frequent searings of limited and indicated

portions of the mucous membrane with the cautery-point, until the secreting surface is so changed that the flux becomes arrested.

Other assistant measures, as the use of vaseline medicated with iodol, menthol, or eucalyptol, constitutional medicines, Turkish baths, the waters of Aix-les-Bains, Challes, and Mont Dore, of mountain air, sea-voyages, and the like, are all of advantage in confirming a cure. I have largely ceased to employ douches at any stage of a nasal disease occurring in the subject of polypus.

Polypoid excrescences and **hypertrophies** of the posterior surfaces of the inferior turbinated body may be removed by Hamilton's instrument (Fig. XCVII., p. 140), or a somewhat similar one known as Jarvis's.

FIBROMATA.

Bosworth has hunted up forty-one cases of this rare disease. The growths are of the same typical structure as those occurring in the uterus and elsewhere, and are said to originate from the nerve-sheaths. They differ from mucous polypi in colour, consistence to the probe, in the absence of peduncle, for they are usually sessile, and in their often lobulated and irregular appearance. These points will be evident on combined anterior and posterior rhinoscopic examination. Their presence is associated with frequent and often grave epistaxis, and there is generally a profuse discharge of muco-pus. In addition to nasal stenosis, with the usual accompanying symptoms of obstruction, they sooner or later lead to the external deformity of the nose known as 'frog-face,' due to expansion of the nasal bones; they exhibit the most unrelenting progress in their growth, causing absorption of bone and other tissues, and encroaching on the pharynx, antrum, orbit, and cranial cavity. If untreated, they destroy life by means of this extension and from repeated hæmorrhage. On the other hand, apart from doing harm by pressure due to increase of growth, they are not malignant in the true sense.

Treatment.—If recognised at an early stage, a permanent cure may be effected by means of the snare or galvano-cautery, operating through the ordinary channels; but when once they have attained sufficient size to encroach on neighbouring areas, some such more formidable external operation as Rouge's or Ollier's, at the hands of the general operating surgeon, will be

necessary. The prognosis is usually favourable, hæmorrhage being the most dangerous complication.

[For details of the external nasal operations, the student is referred to Bosworth's work, and to the larger Systems and Dictionaries of Surgery.]

CYSTOMATA.

Cystic growths are only rarely met with in the nasal choanæ. They usually look exactly like mucous polypi, and their true nature is often shown by their collapsing when examined digitally, as is the case of those growing from the posterior extremities of the turbinals, or on seizure by forceps or snare. Occasionally, as mentioned in the section on Mucous Polypi, those structures undergo cystic degeneration. After evacuation of their colourless or slightly reddish viscid fluid, cysts do not often recur. When they spring from the anterior extremity of the inferior turbinated body, simple incision may effect a cure.

I have seen but two cases of this nature :

Case 1 occurred to me in 1872 in the person of a lady, aged 36, who had long suffered from nasal discomfort, the cause for which had apparently not been discovered. Indeed, her nostrils had never been examined. Observing a glistening body in the upper part of the right middle meatus, I applied a snare in the belief that it was a polypus. In tightening the loop, the growth collapsed, a rush of clear fluid came from the nostril, and only a shred of membrane representing the capsule of the cyst was withdrawn by the instrument. I applied galvano-cautery to the site of attachment, and the patient was effectually and permanently cured.

Case 2 is that of a young lady of half-cast African birth, aged about 25, who suffers from obstruction of the left nostril, on account of a soft cystic growth attached to the posterior part of the corresponding turbinated body. Frequent operations with the snare have resulted in detaching shreds of membrane, and the release of some glary fluid ; but recurrence has always taken place. I have, therefore, recently treated with the galvano-cautery, with the effect of giving permanent relief.

PAPILLOMATA.

Warty growths exhibiting under the microscope typical papillary structure, are very occasionally seen springing from the septum or inferior turbinated bodies in young persons about the age of puberty. They sometimes grow from the lining of the vestibule. According to Hopmann, twenty per cent. of cases roughly diagnosed as polypi are really of a papillomatous nature. This frequency of occurrence has not been observed in the practice of others. Warts are easily snared, and the bases should be destroyed by chemical or galvanic cautery.

Enchondromata.—This term it is convenient to restrict to all cartilaginous tumours springing from any part of the nasal

cavities or accessory sinuses, *other than the septum*. Enchondroses of the triangular cartilage have been already fully discussed as septal cartilaginous spurs. They cause stenosis of the choanæ, but do not displace the bony framework of the nose by excessive growth, which, on the other hand, is often characteristic of enchondromata. These growths are often the occasion of considerable nasal deformity, and may even lead to osseous absorption, and, by pressure, cause destruction in the orbit or cranium. In addition they may give rise to any or all of the symptoms of nasal obstruction. They not unfrequently undergo degeneration of a semi-malignant sarcomatous type. If detected early they can be removed with the nasal drill or trephine, worked by a surgical engine or electro-motor. When large enough to cause deformity or pressure on neighbouring parts an external operation will be necessary. (See note to Fibromata.)

Osteomata, or bony tumours, are of rare occurrence in the nose. They are said to spring from the mucous membrane of the nares, or from the accessory cavities. They are usually pedunculated, and, in addition to more or less evident symptoms of obstruction, they give rise to headache, epistaxis, and a muco-purulent discharge. They can be removed, when accessible, by forceps, snare, or saw.

Exostoses—outgrowths of the bony framework—have been already alluded to in the section on deviations and spurs of the bony septum; in addition I occasionally meet with them anteriorly in the inferior meatus, as pedunculated or as pyramidal growths springing from the maxillary crest, or from the floor of the nasal fossæ, where they cause anterior stenosis. In this situation they may be the unrecognised cause of a stenosis, or the reason for an incomplete relief in cases in which septal deviations have been corrected. They can be easily and safely removed by the nasal saw, drill, or trephine.

MALIGNANT GROWTHS.

Sarcomata sometimes originate in the nasal fossæ, or they may invade them from adjacent structures. The septum and the antral partition are apparently the commonest sites, though I can call to mind cases in which sarcomatous growths have been removed by me from the superior meatus under the impression that they were innocent, until rapid recurrence led to a microscopical examination. Allusion has already been made to the exceptional sarcomatous degeneration of myxomata, fibromata, and enchondromata.

Nasal sarcomatas usually present round, fusiform, and myeloid cells, one or other of these, however, predominating. These growths increase rapidly in children, but often more slowly in adults; they have a fleshy appearance, and are red or violet in colour, and they generally give rise to a bloody, fœtid discharge. When the symptoms of nasal obstruction supervene, pain becomes prominent, which is increased when the tumour invades or expands neighbouring areas. In such circumstances deformity is a natural consequence.

TREATMENT.—If the growth is high up and not rapidly growing, the less it is interfered with the better. When in the lower choanæ, and provided that the case is seen before the growth has attained a large size, some form of external operation (Ollier's, Rouge's, etc.) may be attempted. Palliative anodyne sprays, containing belladonna, morphia, or cocaine, are useful in relieving pain. Mild astringents do no harm.

Carcinomata.—Primary nasal cancer is a rare condition. In children it is of the epithelial or of the encephaloid variety. **Scirrhus** most exceptionally occurs in middle-aged persons. Cancer by invasion from neighbouring parts is more common. The symptoms are very like those of sarcomata, except that there is a greater tendency to ulceration and hæmorrhage, and the neighbouring glands become accordingly involved. The remarks on treatment under the heading of Sarcomata apply here. I have never advised operations myself, nor would I perform them, preferring that the patients take the benefit of the opinion of a general surgeon experienced in such cases.

IV. EPISTAXIS, OR RHINORRHAGIA.

Sir Thomas Watson has pithily observed that nose-bleeding is 'sometimes a remedy, sometimes a warning, sometimes really a disease in itself.'

Epistaxis in connection with operations on the nose is rarely alarming, and is usually arrested by pledgets of cotton-wool saturated with a five or ten per cent. solution of antipyrin or cocaine, packed into the nostril. The same may be said of that resulting from violence, excepting only fracture of the base of the skull, associated with rupture of a venous sinus, or of the internal carotid artery. Of nose-bleeding due to local causes there will often be found some constitutional predisposing factor, and nearly always some erosion or ulceration in the nose. Hæmorrhage from fibromata and malignant growths is almost invariably associated with ulceration. Bleeding from the nasal cavities,

uncomplicated by evident rhinal disease, is, in my experience, nearly always from the artery of the septum, and at a spot at the anterior part of the septum where this artery joins with the ascending branch of the descending palatine artery near the anterior palatine canal. Spurs are very frequent at this spot, which, from their growth, tend to attenuate the mucous membrane ; moreover, foreign bodies are apt to accumulate and help on the formation of an adherent incrustation at this spot, and these crusts, when suddenly removed by picking, violent blowing of the nose, or by sneezing, leave a breach of continuity of the epithelial covering of the spur. Hæmorrhage is not uncommon in the ulcerative processes of syphilis, lupus, lepra, and other dyscrasiæ. In lepra it is said by Hillis to be invariable, and to constitute the earliest premonitory symptom of the disease.

As regards constitutional factors tending to epistaxis, with or without erosions of the mucous membrane, the influence of the generative function can be first considered, because it represents the slightest departure from the normal. I have already pointed out the connection between sexual irritation and turgescence of the turbinated corpora cavernosa, and it is not surprising that nose-bleeding is frequent about puberty, is often the sequel of masturbation, and is occasionally a form of vicarious menstruation. Of blood conditions predisposing to epistaxis, I need do no more here than enumerate the chief, viz. : hæmophilia, purpura, scurvy, anæmia, leukæmia, plethora ; eruptive and relapsing fevers ; acute yellow atrophy and phosphorus poisoning. A diseased and weak state of the vessels may exist in old age, in atheromatous conditions generally, in syphilis, phthisis and alcoholism. Increased blood-pressure may be a factor of epistaxis in diseases of the heart, liver, lungs and kidney, associated with obstructions to the circulation, and in such circumstances is often a warning of impending apoplexy. In my own practice I have more than once been puzzled until the urine has been tested, and revealed the presence of albumen ; and I have recently seen three cases in which it was associated with the condition of chronic bronchitis, emphysema, and dilated right heart.

Treatment.—As I have already mentioned, after nasal operations the bleeding can usually be checked by packing the nostrils with pledgets of cotton-wool soaked in a solution of cocaine ; should this fail, antipyrin in five per cent. solution may succeed. Simply packing the nose with cotton-wool with digital compression is also efficacious. When the epistaxis is not traumatic in origin the bleeding spot should be sought for, and pressure

applied, if possible, over it by the above means. Applications of ice-cold water to the interior and exterior of the nose constitute a very favourite remedy; they act by causing constriction of the small vessels. In my own experience, however, especially in connection with hæmorrhage in the throat, hot water is often more valuable as a douche. It first clears away all imperfectly formed clots, and then favours the firmer coagulation of the oozing blood.

Astringent douches often produce anosmia and other damage. Styptic colloid on cotton-wool pledgets is useful when the hæmorrhage is from the anterior part of the septum. When there is ulceration at this situation slight galvano-cauterization will often promote cicatrization. Sedative and stimulating ointments assist the healing process and prevent further incrustations. If these measures fail, the posterior nares must be plugged by means of Bellocq's apparatus. The procedure is so fully described in surgical manuals that I need not detail it here.

Constitutional treatment appropriate to the condition of the patient must be also adopted, and any errors of living, diet, hygiene, etc., corrected.

V. NEUROSES.

ANOSMIA, OR ANOSPHRESIA.

When impaired smell depends on obliteration of the 'olfactory slit,' as in the case of a hypertrophied middle turbinated body touching the septum, or when a deviated septum is so deflected as to touch the middle turbinal, the treatment is obvious and nearly always satisfactory, unless the abeyance of olfaction is very marked, and of long standing. The same may be said of anosmia the result of polypi, in which cases the sense of smell usually returns after eradication; in some instances, however, the pressure of growths on the delicate olfactory area permanently injures the mucous membrane and nerve-endings; this is especially so in fibromatous and in sarcomatous growths which invade the sensory areas, and permanently interfere with olfaction. Anterior stenosis from inferior turbinated hypertrophy, without obliteration of the middle passage and olfactory slit, causes only impaired smell; moreover, in such cases the taste of flavours is generally not interfered with, unless there is corresponding post-nasal stenosis. On relieving the stenosis, the sense of smell generally returns. The progress towards recovery or otherwise of this symptom under treatment may be conveniently measured by *Z*wardermaker's olfactometer.

In atrophitic, syphilitic, and caseous rhinitis, as well as in some

long-standing forms of chronic hypertrophic rhinitis, the olfactory area is so involved by the morbid lesions that olfaction is greatly and often permanently impaired. Schultze's sensitive cells may be over-stimulated and injured by tobacco smoke and irritating chemical fumes. Snuffs of tobacco, and nasal powders medicated with morphia, alum, or tannin, may also occasionally act prejudicially.

Lesions of the olfactory bulbs and tracts and of the intra-cranial centres, whether from traumatism, tumours, abscesses, hæmorrhages, or other morbid conditions, often cause partial or permanent bilateral or unilateral anosmia.

In addition to the removal of any intra-nasal cause, it is well to administer strychnine, arsenic, phosphide of zinc, valerian, and other nerve tonics internally. Sajous recommends one-fortieth of a grain of the strychnine to two grains of powdered sugar to be used as a snuff, or to be insufflated into the olfactory areas night and morning. As regards electricity, both the constant and interrupted currents should be tried, the negative pole being placed at the root of the nose and the positive at the occiput. Bosworth has recently advised moderate practice with different odorous substances, a change being made every few days. I have not yet had a suitable opportunity of testing this method by education, which, however, could be conveniently used in connection with Zwardermaker's olfactometer.

PAROSMIA.

This condition, which consists in perverted sensation—in illusions and delusions of smell—is not due to lesion of the nasal-mucosa, but connected with lead-poisoning, epilepsy, locomotor ataxy, intra-cranial disease, and with other pathological and functional morbid conditions of the nervous system. The condition of parosmia, or, as Warden calls it, *parophresia*, is often associated with disordered taste, which has been termed by the same author *parageusia*.

VI. FOREIGN BODIES.

PHYSICAL.

Rhinoliths.—Independently of the ordinary foreign substances, such as hairpins, plum-stones, etc., which may be introduced into the nostrils by children, lunatics, and malingerers, there are occasionally found calcareous concretions, which are mostly the result of the deposit of phosphate of lime from the nasal secretions around a piece of necrosed bone, blood-clot, or foreign nucleus. As the rhinolith increases in size it gives rise to *subjective* symptoms of

obstruction, anosmia, nasal voice, and headache, with *objective* evidence in the shape of an accompanying profuse muco-purulent discharge. A nasal calculus appears black or yellowish on visual inspection, and gives a gritty sound on probing; fœtor, if present, is only slight, unless there is concomitant necrosis. Such bodies can be generally removed by a curette, forceps, or snare. They are rarely so large as to require to be first crushed. If not readily seized from the front, Sajous' plan for removing any **foreign body from the nose** should be adopted. It consists of passing a wire, or long, threaded bodkin or Bellocq snare, through the nose to the pharynx, attaching a lint tampon, and by *vis a tergo* drawing the foreign body to the anterior nares.

BIOLOGICAL.

Larvæ, Fungi, and other animal and vegetable parasites, are rarely met with in the nasal cavities in this country. A whiff of chloroform or a spray of alcohol is the best means for their destruction, followed by other antiseptic sprays, douches, or ointments.

B. ACCESSORY CAVITIES.

DISEASES OF THE ACCESSORY CAVITIES.

Simple catarrh of the antrum may doubtless occasionally exist, but it rarely causes symptoms, and I am myself not aware of any case in which a simple acute mucous catarrh has led to suppuration.

Empyema of the Antrum.—This condition is usually unilateral. The commonest cause is probably a carious condition of the teeth in the upper jaw, usually either the bicuspids or front molars. Certainly carious teeth have been present and causal in all but three exceptions of the cases that I have had under my care, numbering forty-six in the last fifteen years, independent of those of which I had knowledge in the practice of my hospital colleagues. It may be true that exceptionally the condition of the teeth is the result of a primary suppurative catarrh of the antral cavity, though such a sequence has not, so far as I could judge, occurred in my experience. Amongst other primary causes are extension of an atrophic or other catarrhal condition from the nasal fossæ to the sinus, especially in syphilitic and strumous subjects. This also is probably but a rare cause of antral suppuration. Next in frequency to diseased teeth as factors are, undoubtedly, intra-antral polypi, which make their way through the *ostium maxillare* into the nose, and whose source of origin is only correctly diagnosed as the nostrils are

cleared. In such a case there is often considerable swelling of the mucous membrane around the *ostium maxillare*, giving rise to an erroneous diagnosis of hypertrophic rhinitis as the primary cause of the empyema. This blocking of the hiatus leads to retention of the secretion, which sooner or later becomes purulent; a permanent change in the mucous lining and in the character of the secretion supervenes, and if this is of long duration a fœtid odour results. Two of the three cases which I have seen of true empyema of the antrum not depending on dental disease were due to antral polypus; one curiously enough was bi-lateral. The third occurred as the result of a cauterization of the base of a nasal polypus arising near to the hiatus. I have seen several cases of purulent rhinitis due to insanitary causes, which apparently extended to the antrum, but which, yielding to suitable hygienic and constitutional measures, as well as to antiseptic and astringent local treatment, are not worthy to be considered as examples of true empyema.

As I pointed out in a paper I read at the Harveian Society in February, 1879, the ordinary symptoms usually described in text-books, such as dull aching pains in the cheek, with heat, redness, and fulness of the soft parts externally, even to expansion of the whole jaw, are chiefly conspicuous by their absence, except in those rare cases in which the nasal orifice is actually occluded. I have but recently learned that in this observation I was anticipated in 1875 by Spencer Watson.

The main *diagnostic* point of antral suppuration is that the discharge is unilateral, of very fluid consistence, of pale lemon-yellow colour, and, as a rule, unconnected with any ulceration or inflammation of the rhinal mucous membrane of the affected side. But above all, the patient is always aware of the offensive character of the flux, which is rarely the case in the ozæna of atrophic rhinitis; this is because in the latter disease the olfactory region is invaded, which is not the case in abscess of the antrum. For the same reason neither the sense of smell nor of taste is much impaired. On visual examination of the (illuminated) nasal cavities pus of the colour described will almost always be seen to be oozing from under the anterior extremity of the middle turbinal body of one side. If this be gently wiped away with cotton-wool on a probe, and the patient made to sneeze, or to lie on a couch with the head slightly bent downwards, the discharge will often re-appear.

Fœtor is not always present, but when evinced can usually be distinguished from the ozæna of atrophic rhinitis by observance of the hints already detailed at page 578. When a tooth is

at fault, as can generally be ascertained on inspection, there will be found either the site of a removed tooth, the remains of a stump, or, possibly, a "filled" cavity, which has prevented drainage and induced an abscess at the root. Diagnosis on this point will be confirmed by history of toothache at or about the time that the nasal flow commenced. Occasionally there may be seen swelling or redness, or, in other cases, a shrinking of the gum. When dental disease is not obvious on mere ocular inspection it sometimes becomes evident on digital palpation or percussion of the teeth separately; but if I have the least doubt I always recommend consultation with a dental surgeon.

Percussion and succussion of the antrum itself are diagnostic aids of the most doubtful value, and whilst not required in well-marked cases, are not often capable of yielding any positive evidence of value in others.

I have had no personal experience of illumination of the antral cavity by means of an electric light placed in the mouth; and I entirely agree with Mr. Christopher Heath that to the practical surgeon the procedure is not only unnecessary but likely to be misleading, for bones vary so much in their degree of thickness that no certainty would be felt even if the antrum remained dark in spite of attempted diagnostic illumination by the electric lamp. Moreover, as one of my drawings in this work indicates, as well as many of those of Zuckerkandl, the cavity of one antrum is often very small, whilst its fellow may be unusually capacious.

Surgeons who may feel hesitation in arriving at a decisive opinion need not fear to make a diagnostic puncture at the site of the canine fossa, through the alveolus in the situation of a previously removed tooth, or through the wall of the middle or inferior meatus of the nose. The natural opening can sometimes be easily catheterized. Personally I have but once tapped an antrum without finding pus; but Ziem reports this occurrence in nine per cent. of a series of 47 cases, a circumstance which seems to indicate that there is undue reactionary activity in antral surgery against the general apathy of ten years ago. Failure to find pus as an *immediate* result of operation must not, however, be too hastily accepted as evidence of erroneous diagnosis, as on more than one occasion a purulent discharge has been delayed for twelve or twenty-four hours after drilling.

TREATMENT is best effected by perforation of the antrum, by means of a trocar or drill, through the socket of a lost tooth, or by removal of any decayed one, or portion of one, thought to be the cause of the abscess. The opening is to be kept patent, and the

cavity syringed with an instrument fitted so that the fluid employed (anti-septic or detergent), instead of returning through this alveolar opening, can pass through the nasal orifice of the antrum.

For the purpose of continuance of this irrigating process, my colleague, Mr. George Wallis, who has rendered dental assistance in all my cases, hospital and private, for the last fifteen years, has ingeniously made and fitted gold and vulcanite plates, with cannula opening. The result has been universally satisfactory, though the length of time occupied in effecting a complete cure has varied from a few weeks or months to (in one case) even years.

If the nasal opening be not already patent it must be made so by the reduction of surrounding hypertrophy, or by catheterization.

To decide when it is really safe to allow the surgical opening to close is, as Heath has said, a point of some nicety; for if it be allowed to close too soon it is often necessary to make a fresh opening; and if it be maintained patent too long, the condition may become chronic. This last is, however, more likely to occur if irrigation be too long continued. I am in the habit of advising my patients so soon as the fluid syringed into the cavity comes clear, to keep the cannula plugged for a gradually increased interval, and only when the immunity from fœtor and pus is maintained after closure for a period of ten to fifteen days, do I permit removal of the plug. Nevertheless, I have seen two cases of relapse, one at an interval of weeks, another after many years. In one of my earliest cases I only succeeded in effecting a cure after searing the cavity of the antrum by means of galvano-cautery, introduced through the alveolar aperture. Another very chronic case was cured by the patient inadvertently using a solution of chloride of zinc, 40 grains to the ounce, which had been prescribed for dilution to an eighth of that strength.

If the disease is of undoubtedly *nasal origin*, the cause, such as polypi and hypertrophy in the neighbourhood of the middle meatus, naturally requires treatment. Catheterization of the natural opening should be attempted by means of a fine catheter with a re-curved point, and if successful an antiseptic lotion can be injected through it. The hypertrophy of the mucous membrane around the stenotic orifice is best reduced by local applications of the galvano-cautery. Politzerization of the nasal cavities is a useful procedure when stenosis is not complete.

If an attempt to reduce the stenosis of the natural orifice, and to medicate the cavity by means of the catheter, fails, as it often

does, several courses are open: the antrum can be tapped through a tooth cavity, through either the middle or inferior meatus of the nose, or through the canine fossa. I myself should prefer to drain through the alveolar process, except in the doubtful cases in which, the teeth being perfectly sound, one would hesitate to sacrifice a healthy tooth. Here the practice of Heath to puncture the antrum above the alveolus may be preferably adopted. In perforating with a curved trocar and cannula, or with a scissors through the inferior meatus, we do not tap the pus cavity at its lowest and most advantageous point, as in the alveolar region, and after cures this procedure must necessarily be more tedious. Should all these methods fail, it is no doubt good surgery to make a considerable opening through the canine fossa, and thence to explore the cavity, with a view to remove any polypi or caseous masses which may explain failure. The cavity under such circumstances has with advantage been cauterized, or curetted and packed with iodoform, and subsequently irrigated with antiseptics—the best of which is probably a solution (1 to 1,000 or 2,000) of biniodide of mercury.

Diseases of the Frontal Sinuses.—Catarrhal suppuration of these cavities is much more commonly found in association with rhinitis, both simple and specific, than is the case with the antrum, and the circumstance may possibly depend on the morphological differences in the orifices into the nose of the respective sinuses. Such suppuration may also be due to occlusion of the infundibular orifice either by reason of the presence of nasal polypi or hypertrophies, or from tumours, such as myxomata growing from the lining of the sinus itself. One-sided pain over the site of the sinus, often too hastily dismissed as 'neuralgic,' is the prominent symptom. I have relieved many such cases by careful upward catheterization of the infundibulum under the anterior extremity of the middle turbinated body, at a point in front of the hiatus semilunaris. An intelligent patient can often be taught to irrigate the cavity himself by this means through the natural opening. If the obstruction is of nasal origin, catheterization and reduction by cautery of the swollen condition of the mucous membrane around the orifice, constitutes the only treatment necessary. After the stenosis has been relieved the secretions usually assume a healthy character in the course of a few weeks. When such a result is not attained, the presence of a growth in the sinus is to be suspected, which can only be removed by trephining the frontal bone, a proceeding not to be decided until after exhaustive examination and consultation with a general surgeon of authority.

Morbid conditions of the **Ethmoidal** cells have been already discussed under the heading of Ethmoiditis, which is, it may be repeated, in any case a very uncommon lesion, and when not the result of syphilis is probably a symptom of malignant disease.

Lesions of the **sphenoidal** sinuses may be either of a syphilitic, tuberculous, or polypoid nature; from the position of the cavity exact diagnosis is usually impossible. Caseous conditions of this region have been alluded to under the heading of *rhinitis caseosa*.

Sphenoidal discharges may be the forerunner, and possibly the excitant, of obstinate post-nasal catarrh.

TREATMENT consists in irrigation by means of sprays and douches on the principles so frequently explained under previous headings. Catheterization, which I have proved to be quite possible on the *cadaver*, is not an operation which can be carried out with precision on the living subject, and is, moreover, not unattended with risk, on account of the proximity of the cribiform plate.

New Growths of the Accessory Cavities may partake of any of the characters of those which affect the nasal fossæ proper, and have been frequently alluded to. Their further discussion would involve a too lengthy trespass on the domains of general surgery.

C. NASO-PHARYNGEAL CAVITY.

NASO-PHARYNGEAL, OR POST-NASAL, CATARRH.

This condition, characterized by accumulations of mucous and muco-purulent secretions in the post-nasal space, is now generally recognised by modern rhinologists as but a symptom of rhinitis proper, but it may exist as a disease *per se*. This last circumstance is, so far as my experience serves, rare in this country, but is reported to be very prevalent on the American Continent, where nearly every other person is said to suffer from 'post-nasal catarrh.' The malady may be either acute, subacute, or chronic, the latter being the form usually met with; the morbid lesion is commonly hypertrophic, but is occasionally characterized in the later stages of chronicity by atrophy of the mucous membrane.

In the large majority of cases the characteristic tenacious post-nasal accumulations represent the thickened and altered secretions which have been poured out from the morbid mucous lining of the nasal passages proper, or of the accessory cavities, notably the ethmoidal and sphenoidal sinuses. Of the nasal conditions of which such catarrh may be a symptom, the most important are hypertrophic rhinitis, together with spurs and deviations of the septum, polypi and other intra-nasal or naso-

pharyngeal growths. Atrophic rhinitis is frequently associated with *naso-pharyngitis sicca.*

Etiology.—When chronic naso-pharyngitis exists as an idiopathic disease, which is said to be the case in 'American catarrh, amongst the commoner exciting causes may be cited a dry and dusty condition of the atmosphere, tobacco and other fumes, and the use of ardent spirits. Scrofula, gout, and rheumatism are predisposing factors, as are also attacks of the exanthemata. The acute variety may arise afresh, or as a relapse, in an individual suffering from chronic post-nasal catarrh, through exposure to cold and wet.

Pathology.—The lesion in true naso-pharyngitis consists in hypertrophy of the mucous lining with an altered condition of the glandular structures. The tubular glands become atrophied, and the large lymphoid glandular mass—the pharyngeal tonsil—is more or less hypertrophied. This hypertrophy in adults is not of the exuberant vegetation-like nature observed in children, and known as 'adenoid growths;' but appears as a more or less thickened and hardened cushion-like mass, with crypts or fissures, which constitute the only secreting area. The secretion is modified, being much more tenacious, thickened, and deficient in fluid than normal. On this account the larger fissure or crypts become sometimes blocked by retained secretion, and occasionally this process leads to the formation of actual cysts.

When the true 'bursa pharyngea' of Luschka exists, this may be the seat of a thick muco-purulent discharge, and even become cystic, the bursa being affected, in fact, in exactly the same way as are the other crypts or fissures. Tornwaldt believes that catarrh of Luschka's pouch, **Bursitis**, is *par excellence the* lesion of post-nasal catarrh, a view which has not, however, been endorsed in this country. I have previously pointed out that it is only an exceptional lesion, and have only to add that the bursa itself is rarely demonstrable by *post-mortem* examination in a naso-pharynx, whether in health or disease.

Symptoms.—These depend on the presence of a thick tenacious mucous or muco-purulent secretion in the post-nasal space, which is felt by the patient, and, acting as an irritant, induces him to make 'hawking' attempts to dislodge the accumulation; such attempts often bring about cough and vomiting, and are not unfrequently accompanied by what I have termed pharyngeal tenesmus. This latter is more marked when there is also lingual varix. In addition to the feeling of a foreign matter in the throat, there is often a bad taste or smell in the mouth. Aprosexia and headache are frequently complained of, and reflex symptoms,

such as asthma, are exceptionally present. Deafness from concomitant Eustachian catarrh is frequently co-existent. It has been recently stated that no naso-pharyngeal disease, except adenoid vegetations, is responsible for impairment of hearing by continuity. This, if correct, is but half a truth, for it should always be remembered that many cases of naso-pharyngeal catarrh in the adult, as well as many of chronic non-suppurative middle ear deafness, are really the result of neglected adenoid vegetations in early life.

Objective Appearances.—On posterior rhinoscopic examination the naso-pharyngeal mucosa is more or less obscured by the muco-purulent accumulations which are especially abundant in the neighbourhood of the posterior nares, Eustachian tubes, Rosenmüller's fossa, or over an enlarged cryptic cavity or bursa. On cleansing the post-nasal space of such accumulations by the coarse spray or brush, existence of the cushion-like enlargement of the pharyngeal tonsil will be evident on posterior rhinoscopy. A catarrhal bursal cavity is detected by the presence of a firm plug of mucus or coagulated lymph blocking its orifices. Digital examination may reveal the presence of any fluctuating cystic cavity. For further details as to the pharyngeal symptoms and evidences of catarrh, the reader is referred back to the description of those characteristic of *chronic pharyngitis* (pp. 190 *et seq.*).

Treatment.—Palliative therapeutics, in the shape of post-nasal pigments, douches, and sprays, are but subsidiary to previous more radical measures, which consist in a thorough scarifying or curetting of the morbid areas, catarrhal crypts or fissures. Like conditions of the bursa should always be looked for, and when found to be diseased should be thoroughly curetted and afterwards cauterized by the galvanic or other form of cautery. Cysts to be detected only by palpation can usually be successfully treated in the same way. Other remedial measures, recommended as applicable to chronic pharyngitis, will be found serviceable when the catarrh extends to the naso-pharynx. The condition of deafness may be greatly alleviated by cure of the naso-pharyngeal catarrh, but may in many cases require further special measures directed to the auditory apparatus.

HYPERTROPHY OF THE PHARYNGEAL TONSIL.

Synonyms.—Adenoids, or adenoid growths, of the naso-pharynx, and post-nasal vegetations or growths.

According to literary researches, hypertrophies of the naso-pharyngeal space have been known to exist since the time of William Hunter. Czermak, in 1860, described a case of growths

in this region; and in 1862 Sir Andrew Clark wrote a short article on 'Naso-palatine Gland Disease.' In 1865 Voltolini and Loewenberg separately described cases of deafness associated with vegetations in the naso-pharynx. The frequency and clinical importance of these hypertrophies of Luschka's tonsil were, however, for the first time clearly insisted on by Meyer, of Copenhagen, in 1868. This accomplished specialist, with a record of 102 cases, gave an admirable account of the symptoms and treatment of the condition called by him, as a result of microscopical examination, *adenoid vegetations*. Since 1870 much active investigation has been expended on these interesting hypertrophies, but little of any importance has been contributed which was not clearly described and understood by Meyer, albeit numerous forms of instruments have been devised for their ready and thorough removal. But in this direction I would award the chief merit to Guye, of Amsterdam, for demonstrating the fact, which I can endorse from long personal and independent experience, that the *educated* index-finger is one of the safest and most efficient eradicators.

Etiology and Pathology.—It has long been known that Luschka's tonsil, which is of large size in children, tends to become reduced to a minimum after the period of growth is over, and that in most individuals of over thirty years of age it is only demonstrable on minute examination. All leucocyte-manufacturing organs, such as the tonsils and lymphatic glands, which are most developed and active during the period of growth, are more liable to hypertrophy on even slight irritation during early years of life. Loewenberg speaks of the 'lymphatic temperament' of those young persons whose lymphatic glands and various tonsils easily inflame or enlarge on slight irritation. Such a condition of vulnerability would appear to be nearly allied to struma, but this diathetic state is not considered to constitute an etiological factor by Meyer, Morell Mackenzie, Bosworth, and other observers. Sajous, writing on the causation of adenoid growths, correctly places most importance on the fact that 'the liability to hypertrophic changes to which the (faucial) tonsils are susceptible in some persons exists also in the pharyngeal tonsil,' and adds 'that a continued or often-repeated inflammatory process may also act as an exciting cause. The inherent deficiency of recuperative powers peculiar to lymphatic glandular tissue being an important element in the pathology of this, as it is in simple chronic inflammation, the hypertrophic process is but the result of the continued hyperplasia.'

Doubtless adenoid growths are somewhat more common in

countries of humid climate, but this circumstance has been considerably exaggerated as a predisposing factor, especially by those who have claimed diminished prevalence in America as accounted for by improved meterological surroundings; for Roe and others who have paid attention to the subject have given contradictory evidence which is unimpeachable.

Most specialists regard attacks of diphtheria, of the exanthemata and other fevers exhibiting nasal and pharyngeal inflammations as frequent factors in the induction of hypertrophic processes in the lymphoid tissues of the naso-pharynx. I would be inclined to invert this statement of cause and effect as of more ordinary occurrence. Hill considers insanitary surroundings, especially in individuals with a liability to catarrh, or the subjects of the strumous, syphilitic, and rheumatic diatheses, as potent and

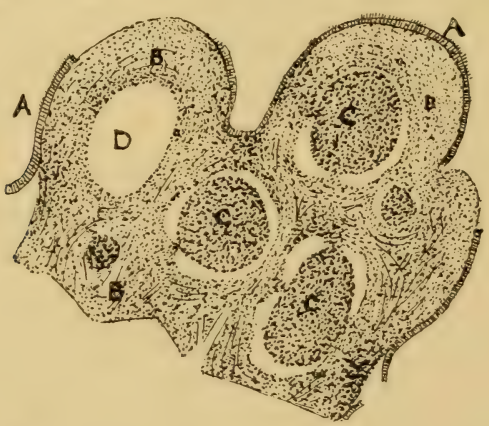


FIG. CCXXII.—SECTION OF A STALACTITE ADENOID GROWTH (under a low power), showing adenoid ground tissue (B) and oval and rounded lymphoid follicles (C); one space (D) in which the follicle has been voided in section is also delineated; the columnar ciliated epithelium (A) is also detached at places.

frequent predisposing factors; whilst attacks of the exanthemata and filth diseases associated with insanitary surroundings are regarded by him as the more usual exciting causes. My own experience certainly endorses an etiological explanation which brings out the association between adenoid growths and insanitary surroundings, but here, again, I would express the opinion that the lymphatic temperament predisposes to the septic inflammation, which may in turn be followed by further hypertrophy. Hill's statement that the adenoid overgrowth is due to the prevention of the normal tonsillar function of leucocyte migration, by diapedesis into the pharynx, by reason of the thickening and impermeability of the mucous covering of the tonsil, induced by contact with irritating contaminations of the nasal secretions, will doubtless give rise to further investigation on this point.

Certainly purulent and muco-purulent nasal catarrh in children, the irritant nature of which is shown by eczema of the nostrils, is almost invariably in association with adenoid overgrowth of the pharyngeal tonsil; but I am not sure that the purulent catarrh is always primary, for I have seen numerous cases in which removal of the growths has led to a speedy cure of the discharge.

Under the microscope these overgrowths of the third tonsil are seen to be of such a structure as to justify the terminology adopted by me at the head of this section. The 'vegetations' are not new growths, but mere exuberant outgrowths, or hypertrophies, from the mucous aspect of the glands. They are composed of lymphoid follicles, embedded circumferentially in the retiform adenoid tissue of His, and are bounded, apically and laterally, by columnar ciliated epithelium; cilia, however, are often absent at points of frequent contact or of friction with the soft palate.

Symptoms.—These have been frequently alluded to in previous sections. They may be summed up as impairment of the normal nasal respiration, with mouth-breathing and its usual complications and morbid results. The most important and frequent symptoms calling for post-nasal treatment are those connected with the functions of respiration, audition, voice-production, and articulation (stammering and stuttering); but such errors of function are often complicated by headache, aprosexia, backwardness and stupidity, derangements of spirits and energy, nightmare, with snoring and disturbed sleep, and the dry mouth and throat on waking; pulmonary and throat troubles, disordered digestion, and reflex croup and cough are not infrequent; indeed, I believe that in almost all, if not all, cases of laryngismus stridulus, or false croup, the subjects would, if examined, be found to be mouth-breathers. Moreover, buccal respiration from adenoids, especially when the faucial tonsils are also enlarged, if marked and long-continued, may give rise to serious facial and thoracic deformity, even in cases in which the functions of the voice and hearing have not been considered by parents and guardians sufficiently impaired to call for medical advice. In almost all cases of high-arched palates in children, post-nasal overgrowths are to be found, but opinion is still divided as to their interdependence. It is probable also, as suggested by Spicer, that the tendency to dental caries in these subjects is in some way connected with mouth-breathing, a point worthy of further observation at the hands of our dental *confrères*. The tendency of lymphoid hypertrophies to atrophy after the twenty-fifth year should be no reason for putting off the operation in

young adults, because many of the symptoms, such as deafness, facial and thoracic deformity, and faulty articulation, may in the meantime become irremediably established.

The DIAGNOSIS is usually easy from an inspection of the face and throat. The open mouth, flattened cheeks, collapsed and dimpled alæ, widened bridge and puffy œdematous root of the nose, down-drawn inner canthi, and the naso-labial fold, have been already more than once alluded to. The veins about the root of the nose, forehead, and inner canthi are sometimes full and prominent, but the transverse nasal arch, described by Spicer, must, I think from my experience, be decidedly infrequent; when present, it no doubt usually points to obstructions in the nose, cranium, or orbit.

On examination of the back of the mouth, the faucial tonsils are often hypertrophied; masses of lymphoid tissue can usually be seen at the back of the pharynx, especially if the paretic palate be displaced forwards and upwards with Fränkel's depressor or by a hook. It is sometimes necessary to spray or brush away the mucous accumulations which often obscure the view, and they constitute a diagnostic evidence of import. The paretic and thickened condition of the palate is also frequently suggestive of naso-pharyngeal trouble. When the faucial tonsils are not enlarged, there is seen, in addition to paresis, a want of definition of the anterior and posterior pillars, and behind the latter, lymphoid hypertrophies along the salpingo-pharyngeal fold; these are sometimes present in post-nasal catarrhal conditions in adults, and have been previously alluded to as *pharyngitis hypertrophica lateralis*. All doubt, however, as to the existence or not of overgrowth of the pharyngeal tonsil can be set at rest by a gentle and careful digital examination. Wounding of the soft palate and any bleeding more than the slight hæmorrhagic staining of the finger, which is in itself an evidence of the presence of soft hypertrophy, indicates clumsy manipulation, unless, indeed, the patient is unusually fractious. It need not be said that it is always desirable, and sometimes almost imperative, to reduce to a minimum the terrors of these procedures, both for the sake of the child and its parents. I therefore often give an anæsthetic, such as nitrous oxide, and having satisfied myself by other signs that the abnormality exists, I finish a *diagnostic* examination with the finger by a *curative* scraping, and so avert the pain and fright of a second operation.

It must be remembered that a soft pad or cushion, with possibly longitudinal ridges, is normally present in children, and even in young adults; unless this cushion is thick, firm and

large, so as to encroach much on the space of the pharyngeal vault, and to obscure the sharp upper margins of the posterior narial openings or approaches to the Eustachian orifices, the diagnosis of hypertrophy is incorrect; but when the naso-pharynx is found blocked by a mass of soft, or occasionally tough, stalactite vegetations, ranging in clusters from the vault and posterior lateral walls, and feeling to the touch like 'a bag of worms or currants,' or occasionally having a more friable consistence, then there can rarely be a moment's doubt in the mind of even the merest tyro.

Students may do much damage by explorations of the post-nasal region, unless they have made themselves practically acquainted with the topography of the parts by repeated digital examinations on the cadaver.

In making such digital examinations of the naso-pharynx, I always direct my dressers and clinical assistants to feel for the free, hinder border of the vomer; the posterior nares can then be explored for polypi and hypertrophies, etc.; the position of the Eustachian opening, with its cartilaginous cushion, should then be made out laterally; and lastly, the roof can be explored from the septum backwards. The growths will rarely be found actually touching the tubal prominence, but are most abundant on the roof and posterior wall of the naso-pharynx, and frequently obliterate the fossæ of Rosenmüller. In all examinations on the living subject the metacarpo-phalangeal joint and digits should be protected by a guard, extemporized or otherwise. Hovell's contrivance (Fig. CCXXIV.), made of soft rubber tubing, is most simple and efficient, and I now employ it by preference to the lobster-claw jointed metal protector (Fig. CCXXIII.) which I formerly advocated. There is one practical point in the use of guards which I have often found it necessary to insist on, namely, that in order to avoid being bitten on withdrawing the finger, the guard should be left between the teeth.

Although I am a strong advocate, both in precept and practice, of examinations by posterior rhinoscopy in all cases where this is practicable, I am bound to admit that the procedure is often impossible in children with naso-pharyngeal obstructions and enlarged tonsils, even with the aid of the various contrivances for pulling forward the soft palate. It is, moreover, scarcely worth the trouble of attempting, as such a step is unnecessary when the other symptoms previously detailed are present.

TREATMENT.—The only certain method of relieving symptoms caused by hypertrophy of the pharyngeal tonsil is to remove the exuberant and obstructing overgrowth. This can be done by

means of curved forceps, opening laterally or antero-posteriorly, passed into the naso-pharynx by the mouth. Of these I prefer Schutz's pattern (Fig. CCXXV.) which nip the glandular tissue from before backwards; but Loewenberg's, or one of the many

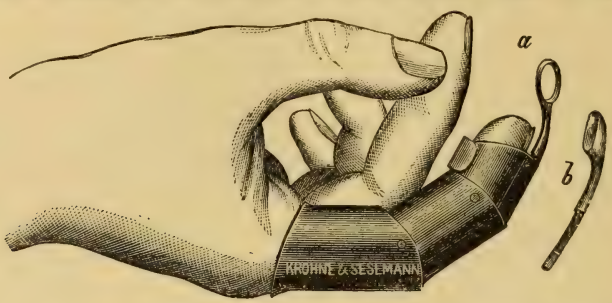


FIG. CCXXIII.—AUTHOR'S FINGER GUARD, with (*a*) Movable Curette, and (*b*) Movable Sharp Spoon.

modifications of the same, which open laterally, are much used. By these instruments the growths are removed piecemeal, some four to twelve insertions of the instrument being necessary. The

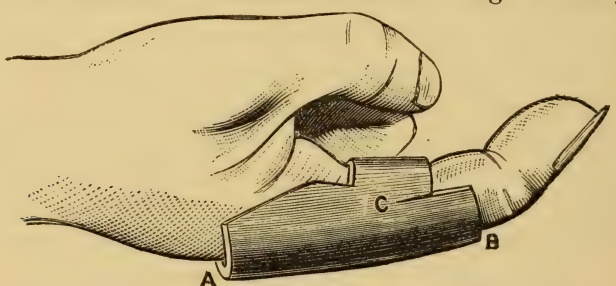


FIG. CCXXIV.—HOVELL'S SOFT RUBBER FINGER GUARD.
The shield is made to cover the finger entirely between the knuckle (*a*), and first phalangeal articulation (*b*), and to project beyond each of these points both forwards and backwards on the dorsal surface; but the tube is split at each side (*c*), so as to allow free flexion of the finger at the angle.

Hartmann's pattern is the best. Curetting through the nose is an operation that can also be fairly efficiently performed by means of a curette with a naso-pharyngeal curve inserted through the mouth;

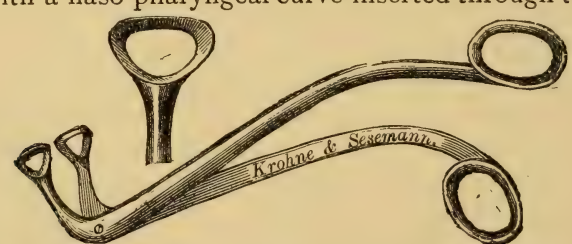


FIG. CCXXV.—SCHUTZ'S ANTERO-POSTERIOR FORCEPS FOR ADENOID GROWTHS.

but it is a painful and generally unsatisfactory procedure, and the same may be said of snaring the growths through the nose or mouth.

I condemn reduction by the galvano-caustic loop or electrode in children, because this method, even in skilled hands, not in-

frequently leads to acute inflammation of the Eustachian tube and tympanum. The same may also occur from traumatism of the tubal orifice, as the result of unskilful manipulations of the forcep or curette. A thimble-shaped curette worn on the index-finger was much in vogue two or three years ago, and I have occasionally employed it, but for some time I have discarded all instruments in favour of the finger-nail of the index-finger introduced into the naso-pharynx for the purpose of a digital examination; by energetic nail-scraping I can insure a more thorough removal of the whole gland than by any instrument unaided by digital touch, an important point considering the tendency to recurrence in a certain, though as yet undetermined, proportion of cases. Some authors state that they commence with the forceps or curette, *but that they have to finish up with the finger*. Those who possess the *tactus eruditus* will, however, prefer to use the nail in the first instance, and save both time and trouble by discarding more or less clumsy instrumental substitutes, which have to be applied in the dark. In this practice I have ascertained that I am supported by Mr. Field, Mr. Matheson, and other leading aurists, whose preference for the finger-nail is probably due to knowledge of the fact that only by this means is injury of the Eustachian orifice certainly insured against.

The operation, though simple in the sense that no complex instruments are necessary, is not without dangerous complications in other than competent hands.

On the vexed question whether an **anæsthetic** should or should not be used for what is often described as a simple operation, I desire to speak in no uncertain tone. In private practice I never operate without one except in the case of individuals above puberty, when *cocaine* is sufficient; nevertheless, in children and in nervous subjects I am usually able to do all that is necessary under the influence of *nitrous oxide*. With such short anæsthesia I have many hundreds of times performed double tonsillotomy and thorough digital scarification of the naso-pharynx at one operation. *Ether*, which is sometimes employed in my practice as supplementary to gas, is no doubt a less dangerous agent than *chloroform*, but it generally stimulates the outpouring of an inconvenient excess of frothy saliva; it also increases the tendency to hæmorrhage; the liability of blood entering the lungs is present whichever agent is employed; the slow recovery from chloroform narcosis increases the possibility of this contingency in the case of that anæsthetic.

The appearance of adenoids on ocular inspection is well demonstrated in Fig. 5, PLATE II., and in Fig. 41, PLATE V.

The case was that of a young lady, aged 17, of handsome personal appearance, except that she exhibited the physiognomy characteristic of the habitual mouth-breather. She came under notice in October, 1877, suffering in an extreme degree from every symptom which has been described as characteristic of the malady under consideration. On the 2nd of November, Mr. Clover administering chloroform, I destroyed all the hypertrophied tissues at the vault of the pharynx, having previously reduced a supplementary hyperplasia which existed on each side of the vomer. There was but little blood lost, very slight after-pain or discharge, and in a week the patient could blow out an ordinary wooden match from either nostril at a distance of eighteen inches. She became able to breathe with mouth closed, while even in sleep the mouth was kept but very slightly open, and respiration, both waking and sleeping, was noiseless.

There is generally some bleeding, but this is seldom of serious extent. Anterior nasal syringing (Fig. LXXIV.) or posterior nasal douching (Fig. LXXII.) with simple alkaline solutions (Form. 78) is required for a few days or weeks, and occasionally a repetition of surgical procedure, on account of imperfect removal by previous attempts, or, it may be, of recurrence. Aural symptoms, due to Eustachian stenosis, may require treatment by Politzer inflation, while internal administration of hypophosphites, and phosphates with malt extracts, cod-liver oil, etc., are always serviceable. When mouth-breathing continues during sleep, the nasal breath-way being free, I advise that the lower jaw should be held up by a lightly-tied bandage or other support, such as Guye's 'Contra-respirator' or 'Anti-snorer,' worn under the chin and over the head, for a few weeks or until the habit is cured. Where there is paralysis from disease of the dilator muscles of the nostrils, I advise gymnastic exercise in the shape of forcible nasal in- and ex-halations to restore their action.

The question is often asked why mere tonsillotomy in the period prior to the recognition of the importance and removal of adenoid growths was so often successful in relieving the symptoms and results of naso-pharyngeal obstruction? The answer is obvious. The bleeding and relief of lymphatic and venous tension not only results in some subsidence in the size of the pharyngeal and tubal tonsils, but likewise, in young children, in the temporary abatement of erectile tumefaction in the nose. The relief, however, is by no means always permanent; and in the light of our later knowledge regarding adenoids it is almost amazing that the results of simple removal of enlarged faucial tonsils were formerly so generally and largely beneficial. Nowadays I *never* perform ordinary tonsillotomy without a supplementary digital examination of the naso-pharynx, to be immediately followed, then and there, by removal of any existing adenoids. Omission to carry out this routine performance recently came under my notice in three cases under very able practitioners in South

Africa. In each a naso-pharyngeal curetting was followed by completion of the good effect of a previous tonsillotomy.

NASO-PHARYNGEAL NEW GROWTHS.

Under this heading are included such tumours as myxomata, fibromata, sarcomata and carcinomata. Of these, fibromata are by far the most common, while the more malignant tumours are exceedingly rare. So-called 'adenoid growths' are not true new growths, but really hypertrophies, as previously explained, and are therefore not properly included in this section.

Myxomata are often seen in the naso-pharynx, but they nearly always spring from the mucous membrane of the nasal passages proper (*vide* FIG. CCXXI., p. 602); their pathology, symptoms, and treatment has been detailed in the previous chapter.

Fibromata differ in no way from true nasal growths of similar structure; they spring from the periosteum or connective-tissue of the vault of the pharynx. They grow and encroach by pressure on neighbouring areas much more rapidly in the young than in adults. In addition to the usual symptoms of post-nasal obstruction they are accompanied by pain, hæmorrhage, and other symptoms characteristic of true nasal fibromata. Headache and aprosexia are always marked when the growths attain any size. **Diagnosis** is easy on account of the pain, bleeding and consistence of the tumours. They are usually attached by a broad base, and are only successfully **treated** by bold operative measures.

These consist during early stages in removal of the mass of the tumour or tumours by evulsion with forceps or strong and suitably curved uterine écraseur, the latter being passed and adjusted behind the soft palate. In some instances, a strong snare is best passed through the nose. The base requires energetic eradicating by a thorough curetting, and the destruction of the whole of the morbid area from which the neoplasm springs by galvanic or other form of cautery. These operations are usually attended with considerable hæmorrhage, and although never alarming in the few cases I have seen, serious loss of blood has occurred in several reported instances. When the area of attachment is very large, and where the growth has encroached on the base of the skull, or pterygoid region, Rouge's or Ollier's or some other external operation may be necessary.

Interference by operation with **sarcomata** and **carcinomata** in this region, though justifiable in some instances, has not been, up to the present, encouraging. Electrolysis in the sarcomatous form has been employed by me successfully in two cases; but I failed with the same treatment in two others.

CHAPTER XXVI.

AURAL MALADIES ASSOCIATED WITH NASO-PHARYNGEAL DISEASE.

PART I.—HOW TO EXAMINE AN AURAL CASE.

INSTRUMENTS NECESSARY.

1. Frontal mirror, as for laryngoscopy, or preferably one of less focal distance, and laryngeal mirror for rhinoscopy (p. 45).
2. Anterior nasal speculum (p. 78).
3. Set of aural specula, Gruber's or Keene's, or Brunton's auriscope.
4. Politzer bag, with nozzle to fit catheter, and soft rubber nasal piece.
5. Auscultation or diagnostic tube, usually but improperly called Otoscope.
6. Tuning-fork, tuned to middle C, and clamped to damp overtones. That known as Gardiner Brown's is the best.
7. Eustachian catheter, two or three sizes.
8. Siegle's pneumatic speculum, fitted with author's exhausting bag.

BEFORE treating generally on deafness associated with diseases of the throat, it will be useful to shortly explain the significance of the various steps to be taken in the diagnosis of a case of aural disease, so as to assist in overcoming at least some of the difficulties. These explanations, in which there is nothing very new, will not, of course, be needed by experts, but they will, I trust, be regarded as acceptable to the general practitioner, who, so frequently seeing cases of recent date, has many more chances of doing good than the specialist, to whom they are rarely brought until the time for cure, or even it may be for relief, has passed away. I am the more induced to believe that this trust has good foundation, because it is a very general complaint that treatises on the ear either assume too much knowledge from the reader, or are so overladen with theory and speculations as to be too lengthy for the busy practitioner.

Investigation of the cause of a middle or internal ear affection is a much more complex process than in the case of trouble affecting, say, the voice or sight; inasmuch as in the first place, while the laryngoscope or ophthalmoscope brings the observer face to face with an exact image of the whole vocal or optical

apparatus, the aural speculum enables us, in but too many cases, only to see mere signs from which we must draw deductions—more or less accurate according to our experience—of the conditions indicated thereby. Further, while it is easy to test the voice, by means of the musical scale, so as to discover the exact note at fault, or to gauge the defects of sight, by means of glasses, with mathematical precision, we have at present no equivalent standard of exact comparison by which we can accurately ascertain the amount and quality of deafness. Lastly, whereas defect of sight or loss of voice is quickly noticed and relief for it is early sought by the patient, loss of hearing power is frequently so gradual that it is not heeded until the history of the case and of subjective symptoms is half forgotten, while the physical conditions have undergone such an amount of pathological change as to render diagnosis difficult, and a complete restoration of hearing improbable.

A. Functional and Subjective Symptoms.—Setting aside affections of the external ear, aural patients come under observation on account of **Deafness, Discharge** from one or both ears, **Pain, Tinnitus**, or **Vertigo.** It is very rare for any of the last four conditions to exist with *perfect* hearing, and this, the special function of the ear, must in all cases be tested by the three methods in use, Conversation, Watch, and Tuning-fork, of which the first two are convenient, but by no means exact.

I. **Hearing Power.—Conversation.**—This test will be employed in the first remarks addressed to the patient, and during the time of taking the history, which should always be done on a systematized plan. All deaf persons complain with some justice that speakers either mumble or shout. Let enunciation therefore be distinct, and let the voice be graduated from rather below ordinary conversational power upwards, at the same time approaching nearer to the patient's ear until he hears what is said. Conversation may be divided into *low*, *ordinary* and *shouting*. If low conversational power is heard, and at a moderate distance, the hearing may be tested by *whispers*, of which it is also easy to make two or three grades—low, ordinary, and loud. To these tests that of *distance* can be added, and one's consulting-room can be marked out to more or less accurately indicate differences in this respect. If the patient is observed to watch the lips of the speaker, direct him to close his eyes, and then observe whether he hears equally well. Ascertain whether he hears better when only one person is speaking, or as at a dance or dinner where there is confusion of noise, or in a railway train or carriage where there is

constant vibration. Also, whether in listening to orchestral music, or to choral singing, individual tones are heard distinctly, or are blurred. Finally, ascertain whether the patient hears his own voice as unduly loud, and whether he speaks of it as contained in the head, and continuing to resound longer than normal.

Watch.—This test should always be employed, especially in the case of children, with the patient's eyes closed. First ascertain hearing-distance of the test-watch for the normal ear. It may be said, for general purposes, that if an ordinary (English-made) man's watch can be heard at a distance of 60 inches, watch-hearing power is normal. Let 60 then be represented as the denominator of the fraction indicating the number of inches at which the watch can be heard in health; the numerator, the actual distance in the case under examination. Thus W. $\frac{12}{60}$, represents that the watch is heard at 12 inches; W. $\frac{60}{60}$, that it is heard at normal distance. When the distance is less than an inch, the addition of a cypher to the denominator would express the quantity in tenths, thus $\frac{5}{600}$ would represent half an inch, though I personally prefer to write it as $\frac{1}{60}$, $\frac{3}{60}$, etc. For unappreciable distances, I employ the signs + and −. Thus W. + Contact, W. − Contact, W. + Pressure, W. − Pressure; or to still further abbreviate, W. + C., W. − C., and W. + P., W. − P., indicate better the condition than an extension of the fractional system. It is recommended to place the watch, in the first instance, at normal distance, and then to allow it to gradually approach towards the patient's ear, to the point at which it will be heard, or to pressure, when its audibility or inaudibility will be demonstrated. The watch-test may be further employed as indicating whether the deafness is due to obstruction of conducting tube, by placing the watch behind the ear, between the teeth, or on the vertex. This is, however, more accurately done by the tuning-fork. The latter test is reserved till later, because its value is greatly influenced by the existence or absence of other symptoms of discharge, pains, etc.

Politzer has invented an instrument which he calls the *Acoumeter*. There is no necessity to describe it further than to say that its inventor claims that each sample is constructed so carefully that it gives a *tic-tac* of exactly the same quality and pitch, and therefore offers a more uniform standard of comparison than the watch. The only disadvantage I have found in it is that the sound produced is so distinct as to be heard at too long distances for the purposes of everyday diagnosis.

II. **Discharge from the Ears** may be largely considered as a subjective symptom, seeing that it is often only reported as existing or having existed; but its origin, when it is objectively

present, must be carefully ascertained by means of optical examination of meatus and membrane (Nos. V. and VI., Physical Signs). Under the present head ascertain the patient's own account of it, especially with reference to its date, its intermittence or constancy, and its fluid and odorous characteristics.

III. **Pain** is in all diseases an important symptom, but is of especial diagnostic value in aural cases. It may indicate only an inflammation or furuncle of the external meatus, or it may point to acute inflammation of the membrane of the tympanum, of the tympanum itself, or even of the membranes of the brain. Pain almost always indicates in aural disease an acute inflammatory condition. Pure neuralgia of the ears is of rare occurrence, and in the generality of auditory nerve disease, pain is conspicuously absent. Pain in the parietal and frontal regions in children suffering from otorrhœa, is an important symptom, and generally points to formation or retention of the discharge in the tympanum, or extension to the meninges of brain. Pain in the mastoid indicates periosteal inflammation of that process, or suppuration of its cells.

IV. **Tinnitus**, or noises in the ear, is of all aural symptoms at once the most constant, most distressing, and too frequently the most difficult of accurate diagnosis and of relief. It may be said briefly that (*a*) *humming*, *buzzing*, or *booming* generally accompanies presence of impacted cerumen, eczema, foreign bodies, or parasites; (*b*) *crackling* or *rustling*, deficiency of cerumen; hairs on the membrane may produce sounds as of an Æolian harp; (*c*) *bubbling* or *gurgling* indicates mucous or other fluid secretions in the tympanum; (*d*) *tidal sounds*, contraction of tensor tympani or other intrinsic muscles; (*e*) *constant rushing*, venous congestion of labyrinth; (*f*) *pulsating*, arterial congestion. The above by no means include all the subjective symptoms complained of by the patient. There is the *hissing* or *singing* as of a tea-kettle, the *music* as of a sea-shell, the *ringing* as of bells, and the actual *tunes* or repetition of tunes perpetually *dinning* in the ears. Almost all these sounds are associated with chronic middle-ear deafness, and depend on intra-tympanic thickenings and accumulations, and sometimes on muscular changes impairing the powers of accommodation. Lastly, there may be extra-aural anomalous forms of tinnitus which will require due investigation as to nature and cause. Toynbee and Hinton long ago recognised the fact that some of these cases depended on dilatation or aneurism of the basilar artery, while others might be alleviated by pressure on the carotids. Dundas Grant has taken advantage of this circumstance of the different arterial source of supply to the middle and internal ear, and differentiates the origin of a tinnitus

by observing the effect produced on the abnormal sounds by compression of the carotid or of the vertebral arteries respectively.

V. **Vertigo** is a symptom of very grave importance; for, although it may sometimes be present in so simple a case as one of impacted cerumen, it generally points to serious mischief in the middle or internal ear. It may be stated almost as an axiom that it is due to inflammation or irritation, direct or reflex, whatever the cause, of the labyrinth. The diseases in which it is most often complained of are acute aural catarrh, chronic aural catarrh, chronic purulent disease—the secretion being retained—muscular spasm, primary labyrinthine inflammations and congestion, and cerebral tumours.

VI. and VII. All symptoms referable to the nasal, naso-pharyngeal, pharyngeal, and even laryngeal regions are to be carefully noted. (See 'Throat Forms,' p. 90.)

Tuning-fork.—'It may be stated as an axiom that the normal ear hears the tuning-fork better through the air than through the bones of the head' (Burnett). If a tuning-fork vibrating on the vertex be heard better on the deafer side, *i.e.*, that on which the watch or conversation is heard least, it is probable that this is due to hindrance offered to the escape of sound-waves by closure of Eustachian tube or external meatus; that is to say, to disease of conducting-tube, not to that of the auditory nerve. This probability is rendered a certainty, if on gentle closure of the meatus by the finger perception of the fork's vibrations is still further increased. It has been remarked that *excessive* pressure of the finger on the external meatus will lead to diminution of perception of the tuning-fork's vibrations, this circumstance being explained by the consequent temporary induction of labyrinthine congestion. As a rule, the ear which hears better the tuning-fork vibrating on the vertex, may be considered the worse ear; but in case of unequal paralysis of the auditory nerves, the converse would hold good. If the nerve be paralyzed, closure of the auditory canal by the finger should not increase the hearing of the fork's vibrations (Roosa).

It occasionally occurs that patients with perforation of one membrane will hear the tuning-fork at the meatus better on that side; this is explained by the increased resonance brought about by conversion of the tympanum and auditory canal into one large air-chamber; this observation only holds good when, however large the perforation, the support of the malleus is intact.

The *duration* at which the vibrations are heard when the fork is in contact with the vertex, teeth, or mastoid process, especially the latter, although not alluded to by other observers, is of service in my own practice as indicating whether there is lessened power

in the auditory nerve, which is so often to be noticed in long-standing catarrhal cases. If the observer, withdrawing the fork the moment the patient ceases to hear the vibrations, place it against his own ear, he can form some idea, according to the time he continues to hear it, of the loss of nerve-power on the part of the patient.

The following are the directions for observation and the conclusions to be drawn, by means of the tuning-fork, of my colleague Dundas Grant, who has paid much attention to this important test, and has, as will be seen, added somewhat to our knowledge on the subject:

'The hearing is tested by means of the tuning-fork, by noting the length of time in seconds it is heard by the patient, in comparison with the length of time it is heard by a normally hearing person. This is observed both when the fork is held with the flat of one of its blades near the meatus but not touching, and when the fork is held with the end of its shank pressing on the bones of the head; and for convenience, the mastoid process of the ear to be tested is selected. By the former method the "air-conduction" (the capacity for hearing sounds conveyed by means of the tympanic apparatus), and by the latter the "bone-conduction" (the capacity for hearing sounds conducted directly through the bones of the head to the internal auditory apparatus), are respectively measured and together compared.

'It will be noted that in the case of a normal ear the tuning-fork is heard through the air longer than through the bones (Rinné's experiment), the difference varying with different tuning-forks. A very convenient fork for general use is the one devised by the late Mr. Gardiner Brown, tuned to the middle C. A specimen may advisably be selected which is heard about 30 seconds longer at the meatus than on the mastoid. For extreme cases a fork sounding for a much longer time (such as Politzer's) is necessary; but with such a heavy fork the possibility of mistaking vibrations felt for vibrations heard is immensely increased.

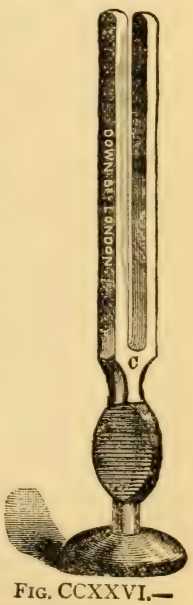


FIG. CCXXVI.—GARDINER BROWN'S TUNING-FORK.

'The following rule for the use of the tuning-fork may be accepted as the most practical at present available:

'1. To test the "air-conduction." Set the tuning-fork vibrating by striking it on the knee; place it with the flat of one blade close to the aperture of the meatus; direct the patient to indicate the moment it stops; then place it opposite your own (or a normal) ear, and note how many seconds longer it is heard. The number of seconds indicates the deficiency of hearing on the patient's part, and should be noted down as, say, "air-conduction," – 10″.

'Should it not be heard longer by the normal ear, the process is to be repeated in the reverse order (by placing it first to your own ear), and the patient credited with, say + 10, or ± 0.

'Should the patient not hear it at all, the fact may be quasi-algebraically expressed by the formula $-\infty$.

'2. To test the "bone-conduction." Apply the shank of the vibrating tuning-fork to the patient's mastoid; when he ceases to hear it, apply it to your own (supposed normal), and note how many seconds you hear it longer than he does. The number obtained is to be noted down, as, say, "bone-conduction," – 10″.

'As before (and this is by far the most frequent event), if you do not hear it longer than the patient, reverse the process; and if he hears it longer than you do, note it thus—say, "bone-conduction," + 10″.

'Other possible results will easily suggest themselves, as, for example: "bone-conduction,' ± 0; "bone-conduction," − ∞.

'As a general rule, in ear affections dependent on naso-pharyngeal diseases, the middle ear is alone affected, while the internal auditory apparatus is normal, and even (apparently, at least) heightened in its perceptive activity. We therefore find the "air-conduction" a negative quantity, and the "bone-conduction" a positive. In a great many cases the decrease of "air-conduction" (with such a fork as has been recommended) turns out to give the same number as does the increase in "bone-conduction." For instance, "air-conduction," − 10″; "bone-conduction," + 10″.

'Space will not permit a discussion of the cause of this phenomenon, but it may be roughly stated that a decrease of bone-conduction, when extreme, points (before old age) to an affection of the internal auditory apparatus, either primary or secondary to middle-ear disease (spreading in cases through the fenestra ovalis, and involving the stapedial articulation).

'The two ears have to be tested separately, both at the meatus ("air-conduction") and on the mastoid ("bone-conduction"); and the results in a supposed case might be conveniently registered as in the forms used at the Central London Throat and Ear Hospital —thus:

$$\left.\begin{matrix}\textit{At Meatus}\\ \textit{On Mastoid}\end{matrix}\right\} \mathrm{R}\ \frac{-\infty}{\pm 0}\ \mathrm{L}\ \frac{-10}{+10}$$

'In cases of deafness from uncomplicated impaction of cerumen, it is commonly found that with great loss of "air-conduction" the "bone-conduction" is very slightly, or not at all, increased—*e.g.*:

$$\left.\begin{matrix}\textit{At Meatus}\\ \textit{On Mastoid}\end{matrix}\right\} \frac{-20}{\pm 0}\ \text{or}\ \frac{-20}{+2}$$

'An increase of "bone-conduction" generally indicates the coincidence of some degree of derangement of the middle ear.

'The results in perforative affections of the tympanum are very various; as a rule there is some increase of "bone-conduction," but not at all in proportion to the decrease in "air-conduction."

'When the internal ear alone is affected, the absence of disease of the conducting apparatus is shown by the existence of the normal preponderance of "air-conduction" over "bone-conduction."

'Various sources of fallacy will readily suggest themselves, but in the great majority of cases the results obtained by the above method will give invaluable information.'

The following diagnostic table, prepared by Grant for his lectures, will aid in the detection of the nature and seat of the disease in typical cases of defect of hearing. It is to be distinctly understood that it is prepared not as an actual and dogmatic statement, but rather as usefully suggestive of the direction diagnosis may take on an intelligent appreciation of subjective evidences:

The patient complains of deafness (= diminution of 'air-conduction').

A. Onset sudden.

Without pain.

a. Bone-conduction normal or increased.

1. Slightly or inappreciably increased.

Cerumen.

2. Considerably increased.

Eustachian catarrh.

β. Bone-conduction diminished or absent.

1. Without sickness or giddiness.

Secondary syphilis of labyrinth.

(Requiring confirmation.)

2. With sickness, giddiness, and noises.

Hæmorrhage into labyrinth.

With pain.

1. Fever slight, and no discharge.

Acute catarrh of middle ear.

2. Fever high, and early discharge.

Acute suppuration of middle ear.

B. ONSET GRADUAL.

Without PRESENT suppurative discharge.

α. Never any discharge.

1. Bone-conduction diminished.

Chronic disease of internal auditory apparatus.

(Or senile changes.)

2. Bone-conduction increased.

(1) Commencing with much tinnitus.

Dry middle-ear catarrh.

(2) Commencing with naso-pharyngeal catarrh, and with moist sounds on auscultation.

Moist middle-ear catarrh.

β. With discharge at an earlier period.

1. With present perforation-sound on auscultation.

Chronic suppurative catarrh, with permanent perforation.

2. Without perforation-sound.

Chronic suppurative catarrh, with cicatrized membrane.

With PRESENT suppurative discharge.

1. With perforation-sound.

Chronic suppurative catarrh of tympanum, and its consequences.

2. Without perforation-sound.

Chronic external otitis or myringitis.

B. PHYSICAL AND OBJECTIVE SIGNS.—I. The **Buccal Cavity** (p. 56); II. **Pharynx** (p. 58); and III. **Naso-Pharynx** (p. 83), must all be inspected, whether before or after the ear proper; and the **Auricle** (IV.) for malformations and outgrowths, inflammations, or cutaneous manifestations. In the **Meatus** (V.) we may see whether an otorrhœa is dependent on external or internal causes, and may diagnose the presence of impacted cerumen, foreign bodies, exostoses, and the like.

VI. The **Membrana Tympani** should be examined with reference to the points in the various columns of the case-form. The appearance of its normal condition, as well as the various structures usually to be noted on ocular inspection with the speculum,

are indicated in the accompanying illustration Fig. CCXXVII.). *Colour* should be mother-of-pearl grey, with just a similar soft *lustre;* though the tint of one membrane will vary in tone from another, just as may one piece of mother-of-pearl from another. There may be slight pink lines, indicating the vessels along the posterior border of the manubrium; while congestions and inflammations will give more or less red colour to the whole membrane, pus, mucus, or other secretions, and thickening of its middle or internal layer will alter or intensify the colour-tone of the membrane; while a similar condition of the dermoid epithelial covering, or deposits thereon, will diminish its lustre. At the point where the extremity of the handle of the malleus is in apposition with the membrane there is a distinct yellow spot. The position and form of this spot is changed by alteration in the position of the malleus. Normally, it is situated at about the centre of the membrane; hence the term *umbo* (boss or navel). Its colour is affected by

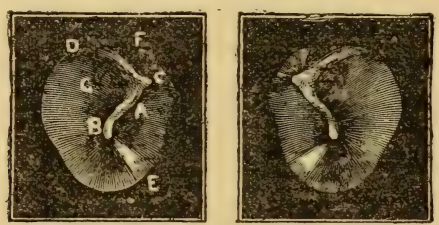


FIG. CCXXVII.—NORMAL MEMBRANA TYMPANI, DOUBLE THE NATURAL SIZE (*after Politzer*).

A. Handle of Malleus. B. Tip of Manubrium—Umbo. C. Short Process of Malleus. D. Posterior Fold. E. Cone or Pyramid of Light. F. Membrana Flaccida. G. Long Process of Incus.

opacities of the membranes; while its mobility on inflation or exhaustion is impaired if there be anchylosis or adhesions. The membrane is variably *transparent* in different subjects. Besides the malleus, one can sometimes see the promontory and long shank of the incus, and even the posterior shank of the stapes (Politzer), pressing as it were against the window, and making at these points a distinct clouding—very different, however, from that of a pathological opacity.

Form is nearly circular, the membrane being rather longer in its vertical diameter, which is something like two-fifths of an inch in length. Many practitioners speak only of the anterior or smaller half, C E, and the posterior larger, D E, the portion between D and C comprising the membrana flaccida of Shrapnell. For general purposes, however, the membrane may more conveniently be divided into four segments, the boundaries being formed by imaginary lines crossing at the centre in the direction

of the handle of the malleus and of the centre of the *cone of light.* This is shown in the small schematic diagrams on p. 643. The shape may be altered by variations of the circumference of the bony ring to which the membrane is attached, and apparently by any new growth in the meatus.

Inclination.—The membrana tympani in its normal condition is inclined at an angle of 45° in its vertical plane, and in its horizontal plane is inclined 10° towards the right on the right side, and 10° towards the left on the left side. It is more important to note that the antero-inferior portion of the membrane is further removed from the external opening of the auditory canal than the posterior-superior part. These inclinations must be considered when estimating the size of the membrane, and also the extent of perforations, opaque spots, etc.

Curvature.—The membrane is generally described as funnel-shaped, the concavity being presented to the eye of the observer, and the apex of the funnel (*umbo*) corresponding to the end of the manubrium, at which point the membrane is drawn distinctly inwards. In point of fact, the shape is that of a funnel, the inner walls of which are slightly convex. The concavity is increased by anything which causes undue traction on the manubrium; while it is diminished or rendered convex on inflation of the tympanum, or by retained purulent or other secretions in that cavity.

The position of the *cone of light* is represented in the diagram. It is due (1) to the lustre; (2) the inclination; and (3) to the funnel shape of the membrane, which last accounts for its pyramidal form. Anything, then, that affects lustre, inclination, or concavity of the membrane will alter the brilliancy, the position, or the shape of this light spot. It may also be stated that the more concave the membrane, the smaller the pyramid of light; and the more convex, the larger it is. This may be demonstrated by observing it under inflation or exhaustion of the cavity of the tympanum: when in the former act it will be increased in size, while by the latter it will be diminished.

Surface and *entirety* must be carefully examined in all cases, especially whenever there is any discharge from the ears; in which case, after gentle syringing, it will be possible to determine whether an otorrhœa is external to the membrane, or whether it proceeds from the tympanic cavity. In this last event there will, of course, be perforation, and there may be also granulations or polypi. Not unfrequently opaque white deposits, often of calcareous nature, or, it may be, due to cicatrices, will be observed

on the surface or in the substance. Inflammation of either coat of the membrane, and many affections of the external meatus, will induce changes in surface smoothness and texture.

Altered *mobility*, or *tension* and *adhesions* of the drumhead, discovered by observing the membrane through the speculum during the act of inflation, or on exhaustion by means of Siegle's pneumatic speculum, are all occasionally to be observed as results of various pathological processes, and require to be noted by the observer as indicating anchylosis of the ossicles, undue pressure, insufficient muscular accommodation, or the products of inflammation.

VII. Knowledge of the physical condition of the **Tympanic Cavity** is regulated chiefly by the appearance of the membrane and the condition of the Eustachian tube, supplementing what we may have gathered by tests with watch, tuning-fork, etc., and from various functional symptoms. It is above all important to remember, in all cases of inflammation of a suppurative character, the very delicate and intimate relation of this cavity with the membranes of the brain, and with the lateral sinus, the jugular fossa, the carotid artery, and the mastoid cells.

VIII. The **Mastoid Process** of the temporal bone is often affected by periosteal inflammation and by suppuration of its cavity as an extension of a similar condition from the tympanum. In all inflammatory diseases of the tympanic cavity, the mastoid should be carefully examined for tenderness, pain, and other inflammatory signs. In such a case treatment by leeching will often aid diagnosis; for not unfrequently, even when signs of actual suppuration are absent, leeching or incisions down to or into the bone are attended with signal benefit. I may here mention that I have rarely found so-called counter-irritation by blistering this region of the least service in any form of ear-disease.

IX. The **Eustachian Tube** will be judged to be pervious by observation with the auscultation-tube, on the performance of the Valsalvan act of inflation, or by use of the Politzer bag, the latter with or without assistance of the catheter. The sounds indicated in the case-form will show, first, by the force of the 'thud,' whether the tube is open, contracted, or impervious; and, secondly, whether the tympanic secretion is normal (moist sound), excessive and fluid (bubbling), deficient (dry), or excessive and inspissated (crackling). When the membrane is perforated, the air will be heard to rush out as from a whistle or reed, even without aid of diagnostic tube. It should be a rule never to pass

a catheter for the sake of diagnosis until failure of attempted inflation by the Valsalvan act or Politzer bag has demonstrated that the tube is impervious to air so propelled.

X. **New Growths** will often require careful seeking, especially granulations within the tympanum and on its roof.

XI. **Eye Affections** are to be noted (and treated) in all cases of syphilitic affections, especially of a congenital or hereditary character; and the observer should also seek commemorative evidences of struma, gout, etc., in *teeth*, *glands*, and *joints*.

[It would be out of place to have given more than a mere outline of the method of examination recommended. Those who feel stimulated thereby to seek further, will find admirable directions for detailed diagnosis in Toynbee's classical work (Churchill), in Keene's concise and very practical 'Manual of Aural Surgery' (Bogue), and in Roosa's 'Practical Treatise on Diseases of the Ear' (Wood and Co.). Still more elaborate explanation of the physiological and pathological indications afforded by tests and observations is to be found in Burnett on 'The Ear' (Churchill). This author also describes with great detail the varying appearances of the tympanic membrane, for information concerning which Politzer (translated by Matthewson and Newton) may likewise be consulted, as also the larger work by the same author, translated by Cassells (Baillière). An accurate representation of all parts of the auditory apparatus, with much interesting information, is to be found in Witkowski's 'Movable Atlas of the Ear,' translated by the author (Baillière).]

Appended is the form which I have prepared for the taking of an aural case, in accordance with the foregoing directions. Books of them are sold by Baillière and Co. A shorter form for use in our out-patient department is printed at page 647; but our clinical assistants are always urged to observe the same patient and systematic method of investigation that the more detailed form necessitates.

AURAL CASE.

History.—Giving, in order, Patient's account of previous aural trouble; symptoms of present attack in order of sequence, as observed by patient, with supposed cause of the same, and especially causes believed to *aggravate* the symptoms, such as damp, high winds, fatigue, anxiety, etc., or to *improve* them, such as dry climates, rest, food, surrounding noises, etc. Endeavour to ascertain exact date of first perceived loss of hearing power, and also date of any exanthem from which patient may have suffered.

Family History.—Evidence of Hereditary Influence, *i.e.*, of other deaf members of the same family, and of Syphilis, Struma, Gout, etc.

General Health—**Temperament**, etc.

Circulation—Pulse, etc.

Respirations—Number of, etc.

Temperature.

Digestion.

Excretion.

Nutrition—Weight.

A. FUNCTIONAL AND SUBJECTIVE SYMPTOMS:

I. HEARING POWER.

Conversation—Ordinary, loud, or shouting.

Note whether patient watches lip-movement of speaker and hears equally well with eyes closed as with them open.

Whisper—Low, ordinary, loud.

Watch—Right.
Left.

Tuning-fork—Note (*a*) INTENSITY, (*b*) DURATION of Vibrations as heard.

a. **External Meatus**—Right.
Left.

b. **Vertex**—Mastoid, Teeth, etc.
Note whether heard louder on the deafer side of the head.
Right.
Left.

c. **Vertex, etc.**—External meatus being closed.
Note the same fact.
Right.
Left.

II. **DISCHARGE.**—DURATION—Whether constant or intermittent. NATURE—Whether serous, purulent, or sanguineous; whether of offensive smell.
Right.
Left.

III. **PAIN**—CHARACTER and SITUATION.
Right.
Left.

IV. **TINNITUS.**—Nature of Sounds as described by Patient; whether constant or intermittent. Class of Sound; whether (*a*) HUMMING or BUZZING, (*b*) CRACKLING or RUSTLING, (*c*) TIDAL, to and fro, (*d*) BUBBLING, GURGLING, or SINGING, (*e*) CONSTANT RUSHING, (*f*) PULSATING, (*g*) ANOMALOUS.

Right.
Left.

V. **VERTIGO.**—Ascertain date of origin, frequency, and character, whether reeling to and fro, staggering forwards, or actually falling, etc. Whether accompanied by vomiting, loss of consciousness, etc.

VI. **NASAL RESPIRATION.**—Whether free or obstructed unilaterally or bilaterally. Character of odour of expired breath.

VII. **DEGLUTITION, etc.**—How affected. (For special Throat symptoms see Throat Case Paper.)

B. PHYSICAL AND OBJECTIVE SIGNS:

		Colour, Form, etc.	Surface, Entirety, Secretion, etc.	Position, Mobility, etc.
I. BUCCAL CAVITY.	Tongue.			
	Walls.			
	Velum.			
	Fauces.			
	Uvula.			
	Tonsils.			
	(See Chap. III., p. 53.)			
II. PHARYNX.				
III. NASO-PHARYNX.	By Rhinoscope. (Chapter V.)			
	By Anterior Exam.			
	By Palpation.			
IV. AURICLE.				
	Right.			
	Left.			
V. MEATUS.				
	Right.			
	Left.			

Here are inserted outline diagrams of Fauces, Posterior Nares, and sections of Nares, as in Throat Forms (*p.* 88).

		Colour, Lustre, Transparency.	Form and Inclination.	Curvature, Cone of Light.	Surface and Entirety, Granulations, etc.	Mobility, Tension, and Adhesions.
VI. MEMBRANA TYMPANI.						
	Right.					
	Left.					

FIG. CCXXVIII.—OUTLINE OF MEMBRANA TYMPANI, WITH IMAGINARY SECTIONAL LINES (NORMAL SIZE).

AURAL CASE PAPER—*Continued.*

VII. TYMPANIC CAVITY.
Right.
Left.

VIII. MASTOID PROCESS.
Right.
Left.

IX. EUSTACHIAN TUBE—Whether pervious; to Valsalvan inflation; to Politzer inflation; to Catheter.

Character of Impulse on Inflation as heard by Diagnostic or Auscultation Tube; whether full, diminished, or suppressed; moist or bubbling, dry or crackling.

Right.
Left.

X. NEW GROWTHS—Either External or Internal, influencing the hearing.

XI. EYE AFFECTIONS.
Right.
Left.

CHAPTER XXVII.

AURAL MALADIES ASSOCIATED WITH NASO-PHARYNGEAL DISEASE.

PART II.—GENERAL ETIOLOGY AND THERAPEUTICS.

In a previous portion of this volume (p. 95) I have alluded to the absolute necessity of those who aspire to successfully treat throat affections, to be *au fait* with the principles and practice of aural surgery, as well as for the aurist to extend his investigations beyond the region of the ear proper to the passages of the nose and throat. Such remarks nowadays savour of truism, but it is only in comparatively recent times that writers on throat and ear diseases have sufficiently insisted on this fact. Even now the departments of the ear and throat are kept distinct in those of our general hospitals where such special departments exist, and they are officered by different practitioners in each case. Ten years ago aural symptoms were indeed almost ignored at throat hospitals; and until quite recently patients with symptoms of ear trouble were in the charge of a member of the staff told off specially for that duty, who attended to them but once a week: this must have amounted in many instances to a mere apology for treatment. The statistics of the Central Throat and Ear Hospital afford incontestable proof that such an artificial divorce of subjects which are by nature so closely wedded, is calculated to lead to incompleteness both of diagnosis and treatment.

In the thirteen years just completed since our hospital was founded (March, 1874), over 59,000 new cases (*i.e.*, absolutely different individuals) have been treated. In the year 1886 the number of out-patients was 4,946. They were classified by the Secretary on the patient's first application as follows:

1731	were suffering from diseases of the		pharynx and larynx.
115	,,		tongue and mouth.
254	,,		nasal passages.
1980	,,	,,	ear connected with throat affections
678	,,	,,	of the ear alone.
188	,,	,,	external throat and neck.

The above secretarial figures represent the statements of the patients themselves of the complaints for which they applied to the hospital, and they necessarily underwent considerable correction at the hands of the Surgical Registrar; for whilst there are many throat affections which cause aural symptoms, there are also many cases of deafness due to naso-pharyngeal disease, of which the patient is either unaware, or which he himself does not connect with his defective hearing. Analyzing the above figures in the light of these remarks, with the aid of the Surgical Registrar's report, it was found that of the throat affections often associated with aural disease, and of the aural cases mostly connected with diseases of the throat, the numbers required the following modifications:

Of the Pharynx:

Subacute inflammation and congestion	265	
Follicular and granular inflammation	57	
Acute tonsillitis	122	
Hypertrophic inflammation of the tonsils	350	
Chronic inflammation without enlargement (lacunar or so-called follicular disease)	85	
Adenoid growths (hypertrophy of the pharyngeal tonsil)	39	
		918

Of the Middle Ear:

Purulent inflammation (acute and chronic), including aural polypi (81), and mastoid caries (8)	815	
Non-purulent inflammation (subacute and chronic)	833	
Catarrhal obstruction of the Eustachian tube	124	
		1772

Of the Nasal Passages:

Subacute and chronic inflammation (including hypertrophic, atrophic and post-nasal catarrh)	211	
Nasal polypi	43	
		254
Total		2944

Although many cases have been eliminated from the list of the pharyngeal disorders in which defective hearing is only occasionally a symptom, as in syphilitic ulceration of the pharynx, it is seen that on our list for one year there is an excess of nearly 1,000 cases over the number estimated simply by the patients themselves, in which ear symptoms might be looked for.

I do not wish to imply that deafness is present in all or even in a majority of cases of pharyngitis, tonsillitis, and naso-pharyngeal

diseases; but I do hold that the hearing power should always be accurately tested in such cases. On the other hand, in many instances of Eustachian catarrh and of enlarged tonsils, there is an associated existence of adenoid growths. And again, by far the commonest excitant of middle-ear maladies is disease of the nasal and post-nasal regions, and this is made a special point in the case-forms of our hospital, a reduced facsimile of which is subjoined.

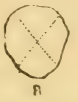
Registered No. .....

CENTRAL LONDON THROAT AND EAR HOSPITAL.

Name ..... *Age* ..... *Occupation* .....

Address .....

UNDER THE CARE OF .....

THROAT DISEASE.....	EAR DISEASE .....
Duration of Illness	*Duration of Illness* .....
Complains of	*Complains of* .....
Supposed Cause	*Supposed Cause* .....
Symptoms. { *Voice*.....	H.P. { *Convn.* R. ..... *Watch* R. .....
Cough	,, L. ..... ,, L. .....
Respn.	T.F. { *at meatus* R..... L.....
Degln.	*on mastoid*
Smell and Taste.....	*Discharge* ..... *Pain*.....
Pain	*Tinnitus* ..... *Vertigo*.....
Naso-Pharynx	
.....	
Larynx	*Auricle* .....
..... *Space for diagram for indicating morbid changes* (p. 88).	*Meatus* .....
.....	*M. T.* R. ..... 
.....	,, L. .....
Thorax	*Mastoid* .....
.....	*Valsalva* .....
.....	*Politzer* .....
General State.....	*Catheter* .....
.....	*Siegle* .....

Prescriptions.	TREATMENT. *Instrumental and Notes of Progress.*
Date.	*Date.*

It will be seen that whilst each case-paper is arranged in two separate columns, one for the record of the condition of the pharynx, larynx, and the lower air-passages, and another for notes on the various parts of the ear, there is also *a space common to both for remarks on the condition of the naso-pharynx.*

It is only by daily recognition and acknowledgment of this intimate connection between these three regions—the throat, the nose, and the ear—that thorough work can be done in either. The mysteries of the larynx may be confined to the pure laryngologist, as may those of the chambers of the internal ear to the aurist; but either one or other would be imperfectly explored if the investigator neglected to examine the avenues to, and the surroundings of, these inner and deeply-seated structures.

The diseases of the pharynx and nasal passages capable of causing aural symptoms have, in a measure, been considered in their appropriate situations, and the proportions which this book has already assumed, preclude my entering at any length into the wide subject of middle-ear disease, the result or complication of naso-pharyngeal maladies. Acting, however, on an expressed wish of many former pupils and friends, I have summarized in the preceding chapter the directions I am in the habit of giving for the proper investigation of a case with aural symptoms, and the form on which our hospital notes are taken.

I shall now proceed to make some general deductions from the information thus afforded, which may aid treatment.

It may be generally stated that in almost every case of deafness connected with the throat, there is an imperfect performance of the functions of the Eustachian tube in relation to the rest of the auditory apparatus. To better appreciate the importance of this fact, a few words are required to explain the **anatomical construction and physiological duties of the Eustachian tube**; after which I shall indicate the principal diseased conditions which may impair its efficiency.

Reverting to our anatomy (p. 33), it will be remembered that the Eustachian canal passes from the pharynx to the middle ear in an upward, outward, and backward direction. The inner two-thirds of the tube has a slit-like lumen, as from compression from before backwards, and somewhat from below upwards; this lumen is greatest at the trumpet-shaped opening into the pharynx, and narrowest at (roughly) the junction of the inner two-thirds with the outer third; from this point—the isthmus—it widens again to expand into the tympanum. The wall of this outer

portion consists of bone, covered by a very thin ciliated mucous membrane, the ciliary action being towards the pharyngeal outlet. The inner and longer portion of the canal consists of a split tube of cartilage; the deficiency in the wall below and somewhat in front, which increases as the pharynx is neared, is filled in by mucous membrane and fibro-muscular structures. The trumpet-shaped opening into the pharynx is seen on section to be bounded behind, above, and partially in front by a hook-shaped scroll of cartilage; the upper and posterior portions being fixed to the base of the skull, and the anterior hook being slightly movable. Below the hook, anteriorly and inferiorly, the tube is completed by membrane. It is only at the faucial orifice and at the isthmus that this membrano-cartilaginous part of the tube is normally patent; in the intermediate area the mucous surfaces are in contact, so that the practically obliterated lumen forms an S-shaped slit. This arrangement is of importance in regulating the supply of air to the tympanum, for it is a potential valve which is only released by action of the muscle that is inserted into the membranous wall, and into the hook-like portion of cartilage. This muscle, which is commonly called the *tensor palati*, but, as Von Tröltsch suggests, might more properly be denominated the *dilatator tubæ*, has little or no action on the soft palate; but during its normal contraction in swallowing, it acts on the membranous portion of the tube and on the hook-like scroll, widening the lumen by its direct action on the former, and by tending to unroll the latter.

Many authors ascribe an equally important action to the *levator palati;* but as it is situated almost parallel to the membranous wall, its only action is to force the floor upwards and backwards. Acting alone, it would tend to compress the tube and obliterate its lumen by its contracting belly heaving the floor up, so to speak. This consideration led Politzer and Cleland to deny its dilating function altogether; but, for my part, I think that, acting *in conjunction* with the *tensor palati* (*dilatator tubæ*), the upheaving action of the *levator* must tend to an increase of the transverse diameter of the passage. It is doubtless, however, principally a palatal muscle.

The *salpingo-pharyngeus* plays no very important part in the human species. It is only exceptionally present, more rarely bilateral, and its representation in a degraded form as a strip of fascia is not even constant. When muscular, it would contribute only to the fixed position of the median portion of the cartilage.

During the act of swallowing the Eustachian tube is rendered

patent by the conjoined action of these before-mentioned muscles, and it is thus that intra-tympanic pressure is regulated.

Politzer draws attention to the important fact that 'the Eustachian canal in the child differs considerably, as regards length, width, and direction, from the adult. Its tympanic orifice is comparatively large, and lies somewhat lower; on the other hand, the pharyngeal orifice is indicated only by a slight depression or fissure, and the posterior (usually prominent) position of the tube forms a hardly noticeable projection in the wall of the pharynx. The tube in the child is also shorter and wider, a condition which is of practical importance, in so far as obstacles in it caused by the products of disease can with greater facility be removed by a current of air.'

For perfect hearing, it is essential that there should be free ventilation of the tympanum through the Eustachian tube, and that the mouth of this canal should be freely opened by muscular action at certain times. All conditions which tend to narrow the lumen by swelling of the mucous membrane, or which hamper the action of the muscles, will prevent the equilibration of intra-tympanic pressure, and cause retention of secretion, and thus inevitably lead to middle-ear disease and its sequelæ.

Non-specific catarrhal affections of the neighbouring mucous membrane, by *extension*, often bring about the same condition in the tubes in continuity.

The chief naso-pharyngeal maladies of this nature are:

I. **Hypertrophic rhinitis**, causing swelling of the tube, with perverted and thick secretion.

II. **Atrophic rhinitis**, in which there is destruction of cilia by the backward extension of inflammation from the nose and its accessory sinuses, leading to a similar condition of the Eustachian orifice, and eventually (also by extension) to dry catarrh of the tube and tympanum.

III. **Growths** in the naso-pharynx inducing Eustachian obstruction, either by contact with the orifice, or by the induced post-nasal catarrh of the neighbouring mucous membrane. Under this category come *adenoid growths*, *naso-pharyngeal tumours*, *polypoid hypertrophy* of the posterior extremities of the turbinated bodies, and true *nasal polypi*, which may project into the naso-pharyngeal space.

In addition to the foregoing, which either directly block the Eustachian orifice by mechanical obstruction, or indirectly by inducing an extension of the catarrhal process, there are other

conditions which, if of long standing, lead to Eustachian obstruction by impeding the action of the muscles which open the mouth of the tube. Under this heading are included :

IV. **Enlargements of the tonsils**, whether benign or malignant. Tonsillar hypertrophy never directly obstructs the Eustachian orifice, but by its frequent upward extension the palate is pushed up, and the action of the muscles thereby markedly impeded. It must also be remembered that there is nearly always associated catarrhal *naso-pharyngitis ;* and in the young, up to the ages of 15 or 20, there will frequently be concomitant *adenoid hypertrophy* of the pharyngeal tonsil, and occasionally catarrh of Luschka's pouch (*Tornwaldt's disease*).

V. **Enlargements of the palate**, whether of the nature of a *gumma, hæmatoma*, or *abscess* (*suppurative peritonsillitis*), occasionally give rise to Eustachian and middle-ear disease.

VI. **Paralysis of the palate**, *diphtheritic* or *bulbar*, is sometimes attended by Eustachian blocking. Under this head may be also included the defective muscular arrangements of *cleft palate*, congenital or acquired.

Various specific diseases which affect the throat may extend to the tube and tympanum.

VII. Under this heading are included *scarlet fever, measles, smallpox, diphtheria*, and less frequently, in an acute form, *pneumonia, glanders, insanitary sore throat*, and *phlegmonous erysipelas*.

The effects of *syphilitic* extension along the Eustachian tube is seldom of an acute nature or suppurative. *Tubercle* acts also subacutely and slowly ; when manifested it often leads to disintegration of the membrane, and is then the cause of a purulent discharge.

Finally, in this connection may be mentioned middle-ear trouble, due to the *forcing* of *mucus* or of *ingesta* into a very patent tube. This exceptionally occurs in *whooping-cough, persistent vomiting*, and unskilful or excessive catheterization. Temporary inconvenience is sometimes caused by coughing, sneezing, and a *trumpeting* mode of blowing the nose. It is a question whether in *pertussis*, which is very generally considered a parasitic disease, and of which otorrhœa is a frequent sequel, morbific germs may not enter the middle ear by the Eustachian tube during a paroxysm of coughing.

The Eustachian orifices have occasionally been injured by *traumatism*, *caustic poisons*, and *scalding fluids*. These rare accidents are more liable to happen in connection with cleft palate.

The conditions, then, capable of causing so-called throat deafness are many and varied, and so, it may be added, are the results.

The first stage, as before mentioned, is usually hypertrophic catarrh and blocking of the tube; this may lead to either mucoid, serous, or suppurative catarrh of the tympanum. The latter may go on to acute inflammation, perforation, chronic otorrhœa, granulations, polypi, exostoses, necroses, etc.; or to mastoid abscess, labyrinthine disease, with associated tinnitus, vertigo, and even intra-cranial suppuration.

TREATMENT of **chronic non-suppurative catarrh** consists, in the first place, in removing the diseased state which originally brought about the Eustachian malady. The appropriate treatment of these exciting nasal and naso-pharyngeal diseases has been discussed under the sections dealing with these conditions. The ear trouble itself requires early and active attention.

The chief indications in non-suppurative catarrh, in addition to removal of the naso-pharyngeal malady, are:

I. To open up the Eustachian communication between the tympanum and the pharynx, that the scretions may escape, and that equilibrium between intra-tympanic pressure and that of the external air may be restored.

II. To treat the diseased lining membrane of the tube and tympanum, and bring it back as near as is possible to the normal.

III. By general dietetic and hygienic measures to diminish any diathetic predisponent to catarrh.

As regards the first indication, namely, mechanically opening up the Eustachian tube by means of a blast of air, the simplest and in some cases an efficient method is that of *Valsalva*. In this procedure the middle ear is inflated by making a forced exspiration with the lips closed and the nostrils held. It is only adapted to those cases where the Eustachian resistance is inconsiderable. A sense of fulness with (sometimes) slight singing in the ear indicates a successful effort. Not more than one thorough inflation should be made on a single occasion. The converse of this mode of inflation, namely, exhaustion of the tympanum by swallowing the saliva several times, the lips and nares being closed, is occasionally useful in active catarrh, and also in connection with painful sensations due to hyper-distension after inflation by air, or the accidental introduction of fluids as a result of nasal syringing. The act of

swallowing tends to open the orifice of the tube, and if the mouth and nostrils are closed, a suction action is exerted on the tympanum and on any retained secretion.

If the tympanic membrane is non-adherent, these induced variations of intra-tympanic pressure are evidenced by a change of curvature, which, in cases of perforation, can be demonstrated by fixing a manometer to the meatus.

Politzer's method, which is more efficient and thorough, depends on the fact that the act of swallowing—say a small quantity of water—helps to render the Eustachian tube patent by muscular action, while the necessary apposition of the soft palate to the posterior wall of the pharynx shuts off the nasal cavity behind. If a forcible blast of air be injected from a bag into one nostril, the other being closed, and simultaneously with the act of swallowing, intra-nasal pressure will be greatly increased; this pressure will usually be sufficient to overcome the Eustachian resistance, and air will thus pass into the tympanum. In children,

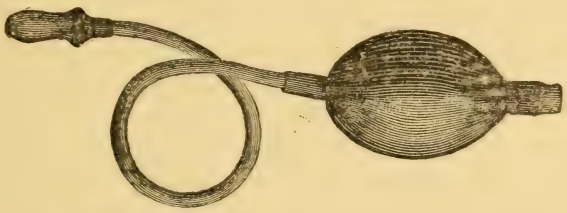


FIG. CCXXIX.—AUTHOR'S FORM OF POLITZER BAG.

on account of the peculiarities already alluded to, the act of swallowing is unnecessary: crying; saying the words 'ah;' 'hic,' 'hæc,' 'hoc;' or indeed almost any *non-nasal* articulate sound, will be sufficient to approximate the palate to the posterior pharyngeal wall. The simplest and cheapest form of Politzer-bag

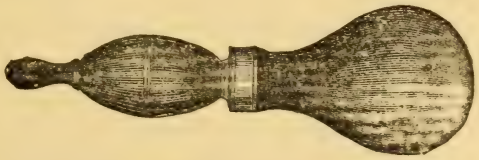


FIG. CCXXX.—KEENE'S FORM OF POLITZER BAG.

is that depicted in Fig. CCXXIX. The nozzle is of soft rubber, with an inner firmer piece to provide against closure of the aperture when the nostrils are compressed.

Another useful form is that known as Keene's (Fig. CCXXX.), the nasal piece of which, on removal of the soft nozzle, is made

so as to fit into the opening of a catheter; it has also a box into which iodine, chloroform, or other drug, sprinkled on wool, can be introduced, and thus the Eustachian tube can be medicated as well as inflated by the one process. The first variety of inflating bag is preferable for the patient's self-use; the second for that of the surgeon.

If inflation is unsuccessful by Politzer's method, recourse must be had to the *Eustachian catheter;* when this is in position in the Eustachian orifice, an air-bag is connected directly or indirectly by rubber tubing with the wide end; a blast of air is easily forced into the tube in most instances. This method is often described as painless, but it is, to say the least, decidedly and universally unpleasant. Frequent catheterization may in any case do harm by irritation of the Eustachian orifice, and in the hands of unskilful persons actual injury may result. In other circumstances this simple irritation has the effect of stimulating a paretic *dilatator tubæ* to healthy contraction. After the passage has been opened up in this way, it is usually possible to keep it patent by systematic Politzerization, a treatment which the patient may be taught to practise for himself. In my own experience catheterization is rarely necessary or desirable more than once a week or fortnight, even in bad cases.

FIG. CCXXXI. WARD COUSINS' INSTRUMENT FOR TINNITUS.

Ward Cousins has recently described in the *British Medical Journal* an instrument which depends on a combination of the principles and methods of Politzer and Valsalva. It consists of two communicating nozzles for fitting into, and accurately closing, the anterior nares; and in connection with this nose arrangement, two bags, one with an inflating and the other an exhausting action. By means of this apparatus, if the patient makes a forcible effort of exspiration with the lips closed, as in Valsalva's method, the tympanic cavity can be alternately inflated and evacuated. This plan gets rid of the occasional deposition of mucus in the middle ear which may happen by other methods, and which is a very painful and harmful accident. This alternate inflation and evacuation has been used by the inventor with success in cases of tinnitus connected with middle-ear catarrh. Our experience with this somewhat complicated method in

hospital practice has been as yet too limited to justify us speaking more than encouragingly of it.

As regards the application of fluids to the lining membrane of the Eustachian tube and tympanum by means of injection through the catheter or otherwise, I have long held objections to the practice as one which is painful, dangerous, and in most cases useless; and I find it difficult to too emphatically condemn it in cases of non-suppurative catarrh, uncomplicated by perforation of the membrana tympani.

Vapours.—Inhalations of the vapour of chloride of ammonium by means of the Burroughs or other inhaler (Figs. LX., LXI., and LXII., pp. 109 to 111) are of great use in those cases in which steam inhalations are inadmissible from liability to increase the catarrhal disposition. They may be employed by the patient performing the Valsalvan act occasionally during ordinary inhaling, or the vapour may be passed directly to the tympanum by means of the catheter as first advocated by Politzer. It is in such cases requisite that the ammonia vapour should be *strictly neutral.* In our practice this is provided for by its passing through a slightly acidulated water-chamber. A few drops of litmus solution in the latter enables the surgeon to recognise the neutrality or otherwise of the vapour.

Should there be unabsorbed mucus in the tympanum which resists the before-mentioned methods, or which cannot be dispelled by the passage of medicated vapours, a small perforation may be made in the postero-inferior quadrant, and a current of air passed, to be followed in some instances by a weak solution of carbonate of soda of not more than ten grains to the ounce. If the mucus is inspissated and not dissolved by this means, suction is to be employed through the perforation by means of a *Siegle's speculum.* This instrument I have had connected with an exhausting air-bag, which, while stronger and æsthetically preferable to an oral suction tube, is not the dangerously powerful instrument that has recently been introduced into practice. The instrument which I advocate, while sufficiently strong to break down adhesions of retracted membranes, is under perfect control for less energetic exhaustive efforts.

It is necessary to repeat that combined with these measures, and as a rule preceding them, the greatest attention must be given to the condition of the throat, and to improvement of the pharyngeal and nasal secretions by inhalations, lozenges, local applications, and by the posterior nasal douche (Fig. LXXII., p. 123). This last measure is immensely preferable to the

anterior, for the reason that fluid is less likely to enter the Eustachian tube and tympanum.

Suppurative Catarrh of the middle ear is usually presented to the specialist in the chronic stage with perforation of the tympanic membrane. Acute suppuration may occur in the course of certain throat complications of the exanthemata as scarlet fever and measles, or occasionally as a traumatic result of galvano-cautery to the nasal passages, or as an accident after bathing. Whatever the cause, anodyne ear-drops of belladonna and opium not only relieve pain, but often prevent an acute median otitis from proceeding to suppuration. The membrane should always be carefully inspected whenever, in the course of acute throat diseases, ear-ache is complained of, and so soon as there is distinct evidence of acute suppuration the membrane should be artificially perforated, and gentle soothing medication only pursued. It is to be noted that while an incised membrane almost always heals, such a result is, to say the least, doubtful if it is allowed to rupture. Cassells therefore justly gave the name of 'Conservative Aural Surgery' to the course here recommended. Chronic cases may be treated on the same lines as the non-suppurative as regards the Eustachian orifice, but we may now go further and inject sprays and medicated solutions by Politzer, or by the catheter in obstinate cases. Whilst treatment by way of the Eustachian orifice is being pursued, the tympanic disease must also be energetically attacked through the meatus. This passage should always be washed out with warm water, or mild antiseptic lotions, before the application of detergent or astringent drops.

The tube should always be freed after syringing, either by Politzer's or other mode of inflation; and finally, treatment should aim at preventing retention of discharge; for extension to the *mastoid cells, meninges, and brain* often results from the opposite practice of too strong astringents or detergents, and hence the traditional objection to *stop* a discharge from the ears.

In very small perforations the opening may require to be enlarged, and the disease be treated by the aid of the intra-tympanic syringe in conjunction with Siegle's exhaustion apparatus.

Besides the forms of abscess just alluded to, the other ordinary complications of otorrhœa are *granulations, polypi, external otitis, eczema,* and *ostoses.* These results only occur after long-standing suppurative catarrh, and are but remotely connected with throat-deafness.

FORMULÆ FOR REMEDIES.

As previously stated in Chapter VII., many of these formulæ are identical with those contained in the *Throat Hospital Pharmacopœia*, to which the reader is referred for further interesting and serviceable details. The list here given is not very extensive, but it includes all those remedies which I have found to possess distinct therapeutic action. The formulæ are arranged mainly in the order in which they are considered in the Chapter on the 'Therapeutics of Throat Diseases.'

The number of the page at the heading of each separate kind of remedy, refers to my views regarding its value and mode of employment, as expressed in the text.

GARGARISMATA—GARGLES. Page 101.

1. Gargarisma Acidi Acetici, T.H.P.

℞ Acidi Acetici ... ... fl. ʒijss.
Glycerini ... ... fl. ʒiij.
Aquam ... ... ad fl. ℥x.
Misc.

Use.—Antiseptic and stimulating when inflammatory throat affections complicate the exanthemata.

2. Gargarisma Acidi Carbolici.

℞ Glycerini Acidi Carbolici ... ... fl. ʒj. ad ʒij.
Aquam ... ... ad fl. ℥x.
Misce.

Use.—Stimulant and antiseptic. Useful in cases of pharyngitis sicca, and all forms of ulceration; also diluted with warm water as a mouth-wash in tonsillitis.

3. Gargarisma Acidi Nitrici.

℞ Acidi Nitrici Diluti ... ... fl. ʒj.
Tincturæ Cinchonæ ... ... fl. ʒiij.
Aquam ... ... ad fl. ℥x.
Misce.

Use.—Stimulant in cases of tertiary syphilitic ulceration of the pharynx.

4. **Gargarisma Acidi Tannici et Gallici, T.H.P.**

℞ Acidi Tannici ... ... gr. 360.
Acidi Gallici ... ... gr. 120.
Aquæ ... ... fl. ℥j.

Misce.

Use.—This is the preparation mentioned at pages 234 and 257, for use as a styptic after excision of the tonsils or ablation of the uvula.

This mixture should be made fresh as required, and in a large tumbler, since the powders occupy considerable bulk. The object of the preparation is that it should be a thick mixture rather than a solution.

5. **Gargarisma Aluminis cum Acido Tannico.**

℞ Aluminis } ... ... āā. gr. 60.
Acidi Tannici }
Aquæ ... ... fl. ℥x.

Misce.

Use.—Astringent in ordinary relaxation and congestion of the fauces.

6. **Gargarisma Boracis.**

℞ Glycerini Boracis ... ... fl. ℥ss. ad ℥jss.
Aquam ... ... ad fl. ℥x.

Misce.

Use.—Mildly alkaline and astringent.

7. **Gargarisma Hydrargyri Perchloridi.**

℞ Liquoris Hydrargyri Perchloridi (B.P.) fl. ℥iii. ad ℥v.
Aquam ... ... ad fl. ℥x.

Misce.

Use.—Stimulant. In syphilitic ulceration of the pharynx. To be used rather as a mouth-wash than as a gargle.

8. **Gargarisma Potassæ Chloratis.**

℞ Potassæ Chloratis ... ... gr. 90 ad gr. 120.
Glycerini ... ... fl. ℥ij.
Aquam ... ... ad fl. ℥x.

Misce.

Use.—Antiseptic. Useful in disorder of the glandular secretion.

9. **Gargarisma Potassæ Chloratis c. Acido Salicylico.**

℞ Potassæ Chloratis } ... ...āā. gr. 90.
Acidi Salicylici ... }
Aquæ ... ... fl. ℥x.

Use.—Antiseptic. Always recommended after excision of tonsils and uvula, and in all forms of insanitary sore throat.

10. **Gargarisma Potassæ Permanganatis.**

℞ Liquoris Potassæ Permanganatis ... (B.P.) fl. ℥j.
Aquam destillatam ... ... ad fl. ℥x.

Misce.

Use.—Antiseptic. In the same proportions, but at a temperature of 90° to 95° F., this gargle may be used as a nasal douche.

11. Gargarisma 'Sanitas.'

℞ 'Sanitas' ... ... fl. ℥ss.
Aquam ... ... ad fl. ℥x.

Misce.

Use.—Antiseptic, or as in the last formula for a nasal douche.

TROCHISCI—LOZENGES. Page 103.

12. Trochisci Astringentes Effervescentes.

These were made, at the suggestion of the author, by Mr. Cooper, of Oxford Street (see *British Medical Journal*, Jan. 24th, 1874). Each lozenge contains 1 grain of Eucalyptus and a small quantity of powdered squill, combined with the ingredients of Cooper's well-known effervescing lozenge.

Use.—Astringent and sialagogue. Most useful as voice lozenges. One, or a portion of one, should be taken before use of voice.

13. Trochisci Antimonialis Compositi Effervescentes.

These lozenges, also made by Cooper, contain in each the ingredients of the compound Sub-chloride of Mercury (Plummer's) pill, B.P.

Use.—In secondary syphilis for the better attainment of both local and constitutional effect.

14. Trochisci Altheæ.

The ordinary Guimauve lozenges of commerce.

Use.—Emollient. Valuable after excision of tonsils or uvula, leaving as they do a soft pultaceous layer over the raw surface.

15. Trochisci Acidi Carbolici, T.H.P.

Each lozenge contains about 1 grain of carbolic acid, and is marked C. A.

Use.—Antiseptic and stimulant. Serviceable in pharyngitis sicca.

16. Trochisci Eucalypti Compositi.

Originally manufactured for the author by Corbyn, Stacey, and Co. Each lozenge contains 2 grains of Chlorate of Potash, 1 grain of extract of Eucalyptus rostrata, ¼ grain of powdered Cubebs, with acid fruit paste, and is marked C. E.

Use.—Largely employed by the author for the joint astringent, sialagogue, and expectorant action of the various ingredients; and preferable to many lozenges containing but one active agent.

17. Trochisci Salini Astringentes.

These lozenges were made to the author's prescription by Roberts, of Bond Street, as a substitute for the above in those cases in which the fruit paste produces disorder of digestion. Each lozenge contains 2 grains of Chlorate of Sodium, 1 grain of extract of Eucalyptus rostrata, ¼ grain of extract of Cubebs, with a basis of Liquorice and Glyco-gelatine.

Use.—The same as the foregoing.

NOTE.—The medicated pastilles of Dr. Whistler are prepared with the same intent of correcting the defects of lozenges made with fruit paste, but are difficult of adoption for general use.

18. **Trochisci Expectorantes.**

These lozenges are also made for me by Roberts, and contain each $\frac{1}{20}$ grain of Ipecacuanha, with a basis of Glyco-gelatine.

Use.—As indicated by the title.

19. **Trochisci Euonymin Compositi Effervescentes** (Cooper).

Use.—Aperient and cholagogue.

20. **Trochisci Hydrargyri Sub-Chloridi Effervescentes** (Cooper).

Each lozenge contains $\frac{1}{2}$ grain of Calomel.

Use.—Aperient and cholagogue.

21. **Trochisci Guaiaci, T.H.P.**

Each lozenge contains 2 grains of Guaiacum, and is marked G.

Use.—In acute inflammation of the tonsils and fauces, and generally for 'soreness' of throat.

22. **Trochisci Morphiæ et Ipecacuanhæ, B.P.**

Each lozenge contains $\frac{1}{30}$ grain of Hydrochlorate of Morphia and $\frac{1}{12}$ grain of Ipecacuanha.

Use.—For allaying irritable cough, and assisting expectoration in laryngeal and bronchial catarrh.

23. **Trochisci Krameriæ, T.H.P.**

Each lozenge contains 3 grains of extract of Rhatany, and is marked R. *Useful* when an astringent only is required. In the practice of the author, the Compound Eucalyptus lozenge is usually substituted.

24. **Trochisci Potassæ Chloratis Effervescentes** (Cooper).

Each contains 3 grains of Chlorate of Potash.

Use.—Antiseptic, stimulant, and sialagogue. Most useful in cases of fœtid breath, dependent on pharyngeal and laryngeal disease. They are but of little use where the disease is situated in the nasal passages.

25. **Trochisci Ammonii Chloridi c. Borace** (Roberts).

Each lozenge contains $2\frac{1}{2}$ grains of Chloride of Ammonium, and of Borax, and is mixed with Liquorice and Glyco-gelatine, the former of which effectually masks the taste of the Ammonia Salt.

The same lozenge is made by Wyeth, but although very effective, is too nauseous to find general favour.

Use.—Most valuable as a voice lozenge, and as a resolvent of catarrhal congestion of the pharynx.

26. **Trochisci Cocainæ.**

These lozenges, each of which contains $\frac{1}{5}$ grain of Cocaine, were made by Messrs. Savory and Moore for my colleague, Mr. Carmalt Jones, who was the first to suggest their administration in this form.

Use.—In diseases of the throat of a painful nature, and as a local anæsthetic previous to examinations and operations.

VAPORES—INHALATIONS. Page 104.

A.—STEAM INHALATIONS.

27. **Vapor Amyl Nitritis, T.H.P.**

℞ Amyl Nitritis ... ... fl. ℥j.
Spiritûs rectificati ... ... ad fl. ℥iij.
Misce.

A teaspoonful in a pint of water at 100° F. for each inhalation, or on a cone of blotting-paper.

Use.—Anti-spasmodic. Valuable in some cases of asthma and spasm of the glottis.

28. **Vapor Ammoniæ, T.H.P.**

℞ Liquoris Ammoniæ (B.P., sp. gr. ·959),
Aquæ ... ... āā. fl. ℥jss.
Misce.

A teaspoonful in a pint of water at 100° to 120° F. for each inhalation.

Use.—Powerfully stimulant; useful in chronic laryngitis, and in functional aphonia. In all cases this inhalation should be used sparingly, as considerable reaction and congestive relaxation follow its employment. Various essential oils may with advantage be combined.

29. **Vapor Benzoini, T.H.P.**

℞ Tincturæ Benzoini Compositæ ... ... fl. ℥iij.

A teaspoonful in a pint of water at 130° to 150° F. for each inhalation.

Use.—A valuable sedative in acute inflammations of pharynx and larynx.

30. **Vapor Benzoini c. Chloroformo.**

℞ Tincturæ Benzoini Compositæ ... ... fl. ℥iij.
Chloroformi ... ... ♏xxv.
Misce.

A teaspoonful in a pint of water at 140° F. for each inhalation.

Use.—Sedative.

31. **Vapor Benzoini c. Oleo Pini Sylvestris.**

℞ Tincturæ Benzoini Compositæ ... ... fl. ℥xxij.
Olei Pini Sylvestris ... ... fl. ℥ij.
Misce.

A teaspoonful in a pint of water at 140° F. for each inhalation.

Use.—Mildly stimulant. Of service in the mucous stage of inflammation of the pharynx or larynx.

32. **Vapor Benzol.**

℞ Benzol ... ... fl. ℥ij.
Olei Cassiæ ... ... ♏vj.
Magnesiæ Carbonatis Levis ... ... gr. 60.
Aquam ... ... ad fl. ℥iij.
Misce.

A teaspoonful in a pint of water at 140° F. for each inhalation.

Use.—Similar to Benzoin, but rather more stimulating. Employed in hospital practice on account of the lessened cost.

33. **Vapor Benzol c. Aldehydo.**

Misce.

A teaspoonful in a pint of water at 140° F. for each inhalation.

℞ Aldehydi ... ... fl. ℥ss.
Vaporem Benzoli ... ... ad fl. ℥iij.

Use.—Mildly stimulant. The Aldehyde is indicated in cases of arrested mucous secretion.

34. **Vapor Conii, T.H.P.**

℞ Sodæ Carbonatis Exsiccatæ ... ... gr. 20.
Aquæ (140° F.)... ... ... fl. ℥xx.
Solve et adde
Succi Conii ... ... fl. ʒij.

The vapour to be inhaled.

Use.—Sedative.

35. **Vapor Creasoti.**

℞ Creasoti ... ... fl. ℥ss.
Magnesiæ Carbonatis Levis ... ... gr. 90.
Aquam ... ... ad fl. ʒiij.
Misce.

A teaspoonful in a pint of water at 140° F. for each inhalation.

Use.—Stimulant. In chronic congestion of the larynx and in ozæna.

36. **Vapor Eucalypti.**

℞ Olei Eucalypti ... ... fl. ʒj. ad ʒiij.
Magnesiæ Carbonatis Levis ... ... gr. 30 ad gr. 90.
Aquam ... ... ad fl. ʒiij.

Use.—An agreeable stimulant, with sedative effect in laryngeal inflammation of a subacute character.

37. **Vapor Lupuli.**

℞ Extracti Lupuli ... ... gr. 60.
(Treated as for conium inhalation, Formula 34.)

Use.—Sedative. Especially useful in laryngeal phthisis and cancer.

The vapour of oil of hops, as recommended in the *Throat Hospital Pharmacopœia*, is very irritating, and far from sedative. Although inconvenient on account of its bulk, the old inhalation prepared by macerating hops in hot water was much more soothing.

38. **Vapor Terebenæ, T.H.P.**

℞ Terebenæ Puræ ... ... fl. ʒij.
Magnesiæ Carbonatis Levis ... ... gr. 60.
Aquam ... ... ad fl. ʒiij.
Misce.

Use.—Sedative and antiseptic in phthisis, and a mild stimulant in catarrhal laryngitis.

39. **Vapor Pini Sylvestris, T.H.P.**

℞ Olei Pini Sylvestris ... ... fl. ʒij.
Magnesiæ Carbonatis Levis ... ... gr. 60.
Aquam ... ... ad fl. ʒiij.
Misce.

A teaspoonful in a pint of water at 140° F. for each inhalation.

Use.—A mild but useful stimulant and resolvent.

40. **Vapor Pini Sylvestris c. Camphorâ.**

Fiat ut supra cum Camphoræ ... ... gr. 5.

Use.—More stimulant than the foregoing.

NOTE.—Any of the above, excepting those of Formulæ 27 and 28, may be used with Lee's Steam Draught Inhaler (page 107).

COLD INHALATIONS.

These refer chiefly to those of the vapour of Neutral Chloride of Ammonium (page 108).

Many of the essential oils applicable for steam inhalations may be dissolved in spirit and added to the water-chamber through which the nascent ammonia passes. In this connection I also employ Ozonic Ether, and the following is a type of a formula for this class of inhalations :

41.

℞ Olei Eucalypti
Olei Pini Sylvestris ... ... āā. fl. ʒj.
Etheris Ozonici
Spiritus Vini Rectificati ... ... āā. fl. ʒxj.
Misce.

A teaspoonful to be added to the water-chamber of the neutral ammonia inhaler.

Use.—Serviceable as a stimulant to promote secretion in chronic catarrhal inflammations of the pharyngeal and naso-pharyngeal passages. The Ozonic Ether relieves spasmodic dyspnœa in cases of stenosis, etc.

NEBULÆ—ATOMIZED FLUID INHALATIONS. Page 112.

These are chiefly recommended for pharyngeal and nasal diseases.

The amount prescribed is the maximum to be used for any one inhalation. A less quantity is often sufficient.

42. Nebula Acidi Carbolici, T.H.P.

℞ Acidi Carbolici ... ... gr. 3.
Aquæ destillatæ ... ... fl. ʒj.
Solve.

Use.—Stimulant and antiseptic, where there is deficient mucous secretion.

43. Nebula Acidi Hydrocyanici Diluti.

℞ Acidi Hydrocyanici diluti ... ... ʒss.
Aquam destillatam ... ... fl. ʒj.
Misce.

Use.—Only about a drachm to be used at a time as a sedative in the cough of phthisis and in carcinoma.

44. Nebula Acidi Lactici.

℞ Acidi Lactici ... ... fl. ʒj. ad fl. ʒij.
Aquam destillatam ... ... fl. ʒj.
Misce.

Use.—Of great service in diphtheria ; it appears to have the effect of dissolving the membranous exudation, and is employed by me to the exclusion of all other local treatment for that purpose. When applied with the brush it may be used to the strength of equal proportions of the acid and water.

45. Nebula Alkalina.

℞ Sodæ Bicarbonatis
Sodæ Biboratis ... ... āā. gr. 8.
Aquæ destillatæ ... ... fl. ʒi.

46. **Nebula Calcis, T.H.P.**

℞ Liquoris Calcis, *q.s.*

Use.—Of some repute as a resolvent in diphtheria.

47. **Nebula Cocainæ.**

℞ Cocainæ Hydrochloratis ... ... gr. 25. ad gr. 50.
Aquæ ... ... fl. ℥j.
Misce.

Use.—As local anæsthetic to be employed for a few seconds prior or subsequent to operations on the throat or nose. In the latter case it is better to apply pledgets of absorbent wool soaked with the stronger solution inside the nostrils, there to be retained for twenty to thirty minutes.

48. **Nebula Morphiæ Bi-Meconatis.**

℞ Liquoris Morphiæ Bi-Meconatis (Squire) ... ♏v.
Aquæ ... ... fl. ℥ss.
Misce.

Use.—Sedative.

49. **Nebula Potassæ Chloratis.**

℞ Potassæ Chloratis ... ... gr. 20.
Aquæ destillatæ ... ... fl. ℥i.
Misce.

Use.—Antiseptic and stimulant.

50. **Nebula Sodii Salicylatis.**

℞ Sodii Salicylatis ... ... gr. 20.
Aquæ destillatæ ... ... fl. ℥j.
Misce.

Use.—Resolvent and antiseptic.

51. **Nebula Zinci Sulpho-Carbolatis.**

℞ Zinci Sulpho-carbolatis ... ... gr. 5.
Aquæ destillatæ ... ... fl. ℥j.
Misce.

Use.—Astringent and antiseptic.

FUMING INHALATIONS. Page 116.

The ordinary method of employing these inhalations is to steep unsized white or brown paper in aqueous solutions of nitrate of potash of three strengths, viz., 30 grains, 40 grains, and 60 grains to the ounce.

Such is the basis of almost all forms of asthma cures. The most useful addition in the way of drugs containing volatile principles are, Eucalyptus, Santal, and Stramonium.

Another form of fuming inhalation is that of sublimed calomel, as figured and described at page 117.

DRY INHALATIONS. Page 109.

These preparations are employed by me in connection with Oro-nasal inhalers, and are indicated in cases of phthisis, dry hot inhalations being generally impracticable.

The following are types :

52. **Vapor Siccus** (Coghill).

℞ Tincturæ Iodi
Acidi Carbolici
Creasoti (vel Thymol) ... ... āā. ʒij.
Etheris Sulphurici

Misce.

Use.—Stimulant and antiseptic. This is the form recommended by Dr. Coghill.

53. **Vapor Siccus** (L.B.)

℞ Creasoti ... ... fl. ʒss.
Olei Pini Sylvestris
Olei Eucalypti ... ... āā. ʒj.
Tincturæ Benzoini Co. ... ... ʒij.

Misce.

Use.—Stimulant, but less likely to provoke cough than the above.

NOTE.—The vapours of Pine Oil, Eucalyptus Oil and Pure Terebine can also be inhaled, uncombined, either from the oro-nasal inhaler or from a piece of lint.

PIGMENTA—FLUIDS FOR EXTERNAL AND INTERNAL APPLICATION.

A. EXTERNAL. Page 121.

54. **Liquor Epispasticus, B.P.**

55. **Linimentum Iodi vel Tinctura, B.P.**

56. **Linimentum Sinapis Compositum, B.P.**

57. **Pigmentum Chloral c. Camphorâ.**

℞ Camphoræ (reduced to fine powder with a few drops of rectified spirit)
Chloral Hydratis āā. ʒss.

Misce bene.

This preparation, which is of American origin, was introduced to the profession in England mainly by the author in 1874. (See *British Medical Journal*, March 7th, 1874.)

Use.—Employed as an external anæsthetic in neuralgic affections of the throat, and indeed for any form of pain which can be relieved by external means.

B. INTERNAL. Page 126.

58. **Pigmentum Acidi Carbolici.**

15 grs. to 30 grs. in the ounce of distilled water.

59. **Pigmentum Acidi Lactici.**

Equal parts of the ingredient and distilled water.

Use.—In diphtheria. This solution is much stronger than that ordinarily recommended. (See Formula 44.)

59*. **Pigmentum Aluminii Chloridi.**

10 grs. to 30 grs. to the fluid ounce of distilled water.

60. **Pigmentum Argenti Nitratis.** Page 295.

10 grs. to 60 grs. in the fluid ounce of distilled water.

61. **Pigmentum Cupri Sulphatis.**

10 grs. to 20 grs. in the fluid ounce of distilled water.

62. **Pigmentum Ferri Perchloridi.**

20 grs. to 90 grs. in the fluid ounce of distilled water.

63. **Pigmentum Iodi c. Acido Carbolico.**

℞ Iodi, Acidi Carbolici, Potassii Iodidi ... ... āā. gr. 4.
Glycerini ... ... fl. ℥ss.
Aquam destillatam ... ... ad ℥j.
Misce.

Use.—In slight chronic pharyngitis and in secondary syphilis.

64. **Pigmentum Iodoformi vel Iodol.**

℞ Iodoformi vel Iodol ... ... ℥j.
Ætheris Communis ... ... ad ℥j.

Use.—Dissolve by adding the iodoform or iodol gradually to the ether with frequent shaking. Useful in reducing naso-pharyngeal congestions and in granular pharyngitis. The iodol is preferable to the iodoform, on account of the smell, but is hardly so active in effect.

65. **Pigmentum Zinci Chloridi.**

10 grs. to 30 grs. in the ounce of distilled water.

66. **Pigmentum Zinci Chloridi c. Morphiâ.**

℞ Zinci Chloridi ... ... gr. 10 to gr. 30.
Morphiæ Hydrochloratis ... ... gr. 8.
Glycerini
Aquæ destillatæ ... ... āā. ℥ss.
Misce.

NOTE.—Morphia gr. 1, or Cocaine gr. 5 to the fluid ounce, may be added to either the copper, iron, or zinc solutions.

67. **Pigmentum Ovi Vitelli.**

℞ Tincturæ Benzoini Compositæ
Tincturæ Camphoræ Compositæ ... ... āā. ℥j.
Tincturæ Belladonnæ ... ... ℥j.
Misce et adde Vitellum Ovi unum.

Use.—This preparation has been found of great value in cases of buccal and lingual tuberculosis, as an application to be employed immediately before the taking of food. It has been somewhat modified by the addition of Cocaine since the more general introduction of that ingredient into practice.

INSUFFLATIONES—POWDERS FOR INSUFFLATION.

Insufflations are used by me in only a modified degree, and are limited in number to the following:

68. **Insufflatio Zinci Chloridi.**

℞ Zinci Chloridi ... ... gr. 5.
Bismuthi Oxy-chloridum ... ... ad ℥j.
Misce.

Use.—Astringent and resolvent.

69. **Insufflatio Zinci Chloridi c. Morphiæ Hydrochlorate.**

℞ Zinci Chloridi }
Morphiæ Hydrochloratis } ... ... āā. gr. 5.
Bismuthi Oxy-chloridum ... ... ad ℥j.
Misce.

Use.—Astringent and sedative, especially for relief of cough in laryngeal phthisis.

70. **Insufflatio Iodoformi vel Iodol.**

℞ Iodoformi vel Iodol ... ... gr. 5.
Bismuthi Oxy-chloridum ... ... ad ℥j.
Misce.

Use.—Much recommended in cases of tuberculous or syphilitic ulceration, but not largely employed in my own practice in laryngeal disease.

71. **Insufflatio Cocainæ Hydrochloratis.**

℞ Cocainæ Hydrochloratis ... ... gr. 5 ad gr. 10.
Bismuthi Oxy-chloridum ... ... ad ℥j.
Misce.

Use.—Sedative, and serviceable prior to attempts at swallowing for relief of pain in cancer and laryngeal phthisis.

COLLUNARIA—NASAL DOUCHES. Page 121.

These preparations may be used with either the anterior or posterior nasal douche. Ten ounces will usually be found a sufficient quantity to use at one time for the anterior douche, and more than a pint should never be used. The syringe for the posterior douche holds four ounces, and about two syringes full are usually to be employed on each occasion of administration. In the use of the anterior nasal douche on the siphon principle, the vessel containing the fluid should not be placed much above the patient's head, or the current will descend with too great force. In cases of post-nasal catarrh, and in cases in which use of the anterior nasal douche seems to cause aural trouble, or where there is a more than usually tenacious secretion requiring removal, the posterior nasal douche will be found superior to the anterior.

All nasal douches should be used at a temperature of about 95° F.

72. **Collunarium Acidi Carbolici.**

℞ Glycerini Acidi Carbolici ... ... fl. ℥j.
Aquam tepidam ... ... ad fl. ℥x.

Use.—Antiseptic and detergent.

73. **Collunarium Boracis.**

℞ Glycerini Boracis ... ... fl. ℥ss. ad fl. ℥x.

Use.—Sedative and antiseptic.

74. **Collunarium Potassæ Permanganatis.**

℞ Liquoris Potassæ Permanganatis ... fl. ℥j. ad fl. ℥x.

Use.—Detergent.

75. **Collunarium Sodæ Sulphatis.**

℞ Sodæ Sulphatis ... ... gr. 120.
Aquæ ... ... fl. ℥v.
Solve. To be diluted with equal parts of hot water.

Use.—Detergent.

76. **Collunarium 'Sanitas.'**

'Sanitas' ... ... fl. ʒij. to ʒiv. ad fl. ℥x.

Use.—Antiseptic and detergent.

77. **Collunarium Zinci Sulpho-carbolatis, T.H.P.**

Zinci Sulpho-carbolatis ... ... gr. 20 ad. fl. ℥x.

Use.—Antiseptic.

78. **Collunarium Potassæ Chloratis Compositum.**

℞ Potassæ Chloratis
Sodæ Bicarbonatis } ... ... āā. ℥ss.
Boracis
Sacchari Albi ... ... ʒj.

Misce.

Directions.—Dissolve a teaspoonful in 5 to 10 ounces of water at 95° F. for each douche.

UNGUENTA—OINTMENTS.

Ordinary ointments for external applications are not given—except the first of the following prescriptions, which is in use at the Central London Throat and Ear Hospital, for the external application to the throat in cases of tertiary syphilitic disease of the larynx. All the other forms here given are for nasal diseases, and are used preferably to medicated bougies and pledgets of cotton-wool—the Buginaria and Gossypia of the *Throat Hospital Pharmacopœia.*—Most of the nasal ointments are employed by me after the use of the douche, though sometimes independently of any such treatment.

79. **Unguentum Hydrargyri c. Belladonnâ.**

℞ Extracti Belladonnæ ... ... ʒj.
Unguentum Hydrargyri } ... ... āā. ℥ss.
Unguentum Iodi

Misce.

THE FOLLOWING ARE ALL FOR NASAL APPLICATION.

80. **Unguentum Atropiæ.**

℞ Liquoris Atropiæ Sulphatis, B.P. ... ... ʒj.
Vaselinum vel Lanolinum ... ... ad ℥j.

Misce.

Use.—Sedative after application of the galvano-cautery, and for arrest of excessive nasal secretion.

81. **Unguentum Acidi Boracici.**

This ointment, whether made according to the British Pharmacopœia or otherwise, should be in the proportion of about 1 to 6 of the medium.

Use.—Antiseptic, sedative, and 'healing;' has proved serviceable in my practice in nasal cases associated with cutaneous eczema.

82. **Unguentum Eucalypti.**

℞ Olei Eucalypti ... ... ℥xx. ad fl. ℥j.
Vaselinum vel Lanolinum ... ... ad ℥j.
Misce.

Use.—Antiseptic ; employed for keeping the mucous membrane moist in cases of dry catarrh.

83. **Unguentum Hydrargyri.**

℞ Unguenti Hydrargyri Nitratis, mitius }
Unguenti Hydrargyri Nitratis, Oxidi } ... āā. ℥ss.
Vaselinum vel Lanolinum ... ... ad ℥j.
Misce.

Use.—Detergent in cases of syphilitic ulceration.

84. **Unguentum Iodol.**

℞ Iodol ... ... gr. 10 to gr. 25.
Vaselinum vel Lanolinum ... ... ad ℥j.
Carefully triturate the Iodol and mix.

Use.—Antiseptic. This preparation has superseded that of iodoform, formerly recommended.

85. **Unguentum Cocainæ Hydrochloratis c. Eucalypto.**

℞ Cocainæ Hydrochloratis ... ... gr. 5.
Olei Eucalypti ... ... ℥xx. ad fl. ℥j.
Vaselinum vel Lanolinum ... ... ad ℥j.
Misce.

Use.—Beneficial in nasal cases dependent on hyperæmic hypertrophy of the turbinated bones, also in nasal polypus after operation, and as a preventive of sneezing, and as allaying many of the symptoms in hay-asthma.

MISTURÆ—MIXTURES.

86. **Mistura Aconiti.**

℞ Tincturæ Aconiti ... ... ℥xv.
Aquam ... ... ad fl. ℥ij.
Misce.

A teaspoonful for a dose, to be given every quarter of an hour for four doses ; then every half-hour for four doses ; then every hour, two hours, etc., the intervals being increased as the skin becomes moist, and the heart's action lowered.

Use.—Of great value in reducing temperature and pulse in early stages of inflammatory affections, tonsillitis, etc.

87. **Mistura Ammonii Chloridi c. Sodii Iodido.**

℞ Ammonii Chloridi ... ... gr. 20.
Sodii Iodidi ... ... gr. 3.
Ext. Glycyrrh. Liq. ... ... ℥xx.
Aquæ ... ... ℥j.
Misce.

Use.—In chronic naso-pharyngitis associated with middle-ear inflammation and tinnitus.

88. **Mistura Belladonnæ c. Opio.**

℞ Tincturæ Belladonnæ } ... ... āā. ℥v.
Tincturæ Opii }
Aquam Camphoræ ... ... ad fl. ℥j.
Misce.

Use.—In catarrhal conditions causing coryza. Will often arrest a cold in the head if commenced on first approach of symptoms. For this purpose it should be taken *between* meals, say at 11 a.m. and 4 p.m.

89. **Mistura Expectorans.**

℞ Ammoniæ Carbonatis ... ... ℥v.
Tincturæ Scillæ ... ... ℥x.
Tincturæ Camphoræ Compositæ ... ... ℥xv.
Syrupi Zingiberis ... ... fl. ℥j.
Infusum Serpentariæ ... ... ad fl. ℥j.
Misce.

Use.—A good expectorant mixture.

90. **Mistura Ferri Ammoniata.**

℞ Tincturæ Ferri Perchloridi ... ... ℥x ad ℥xx.
Ammonii Chloridi ... ... gr. 10 ad gr. 20.
Aquæ Chloroformi ... ... fl. ℥ss.
Aquam ... ... ad fl. ℥j.
Misce.

Use.—In naso-pharyngeal and aural catarrh associated with anæmia. The Sal Ammoniac appears to aid in the assimilation of the Iron.

91. **Mistura Hydrargyri Perchloridi.**

℞ Hydrargyri Perchloridi ... ... gr. $\frac{1}{32}$ ad $\frac{1}{12}$.
Decocti Cinchonæ ... ... fl. ℥j.
Misce.

Use.—In tertiary syphilis.

92. **Mistura Hydrargyri Biniodidi.**

℞ Hydrargyri Perchloridi ... ... gr. 1.
Potassii Iodidi ... ... gr. 60.
Tincturæ Cinchonæ ... ... fl. ℥iv.
Misce.

Dose.—One to two teaspoonfuls thrice daily.

Use.—In tertiary syphilis.

In private practice I find the preparation known as *Sirop de Gibert*, which contains $\frac{1}{6}$ of a grain of Biniodide of Mercury and 8 grains of Iodide of Potassium with Syrup in each tablespoonful, a useful and 'elegant' mode of administering this drug.

93. **Mistura Potassii Bromidi.**

℞ Potassii Bromidi... ... ... gr. 10 ad gr. 30.
Aquæ Camphoræ ... ... fl. ℥j.
Misce.

94. Mistura Potassii Iodidi.

℞ Potassii Iodidi ... ... gr. 3 ad gr. 10.
Spiritus Ammoniæ Aromaticæ ... ... ℥xx.
Infusum Gentianæ Compositum ... ... ad fl. ℥j.
Misce.

Use.—In tertiary syphilitic affections, etc. Iodide of Sodium, in the same or smaller doses, may be substituted for the Potassium Salt in those cases in which coryza results from use of the latter.

95. Mistura Salina Aperiens.

℞ Potassæ Nitratis... ... ... gr. 20.
Magnesiæ Sulphatis ... ... fl. ℥j.
Ætheris Nitrosi Spiritus ... ... ℥xx.
Aquam Camphoræ ... ... ad fl. ℥j.
Misce.

Use.—A good aperient for the commencement of many affections of an inflammatory character.

96. Mistura Salina Aperiens c. Ferro.

℞ Ferri Sulphatis ... ... gr. 2.
Misturæ Salinæ Aperientis ... ... ℥j.
Misce.

Use.—Combined aperient and tonic. The combination increases the action of both.

97. Mistura Sodæ c. Gentianâ.

℞ Sodæ Bicarbonatis ... ... gr. 25.
Spiritus Ammoniæ Aromatici ... ... ℥xx.
Infusum Gentianæ Compositum ... ... ad ℥j.
Misce.

Use.—Very valuable where there is dyspepsia and digestive disturbance, as in chronic pharyngeal inflammations; and a good alkaline vegetable tonic after recovery from quinsy, etc.

98. Mistura Sodæ Salicylatis Composita.

℞ Sodæ Salicylatis... ... ... gr. 10 ad gr. 25.
Sodii Chloratis ... ... gr. 5 ad gr. 8.
Spiritus Chloroformi ... ... ℥x.
Decoctum Cinchonæ ... ... ad fl. ℥j.
Misce.

Dose.—Every hour or two until pain is relieved, when the dose is to be diminished and the intervals of administration lengthened. To this mixture Sulphate of Magnesia may sometimes be usefully added.

Use.—In tonsillitis, where there is simultaneous general rheumatism with hyperpyrexia.

99. Mistura Terebenæ.

℞ Terebenæ Puræ ... ... ℥v. ad ℥x.
Pulveris Tragacanthi Compositi ... ... gr. 5.
Aquam Chloroformi ... ... ad ℥i.
Misce.

Use.—Sedative, expectorant, and antiseptic. Useful in subacute and chronic laryngeal catarrh.

100. **Mistura Tonica.**

℞ Ammoniæ Carbonatis ... ... gr. 3 ad gr. 5.
Infusi Quassiæ ... ... fl. ℥j.
Misce.

Use.—Simple bitter tonic.

101. **Mistura Tonica c. Ferro.**

℞ Liquoris Ferri Perchloridi ... ... ℥x. ad ℥xxx.
Infusum Quassiæ ... ... ad fl. ℥j.
Misce.

With this mixture saline aperients may be advantageously combined.

102. **Mistura Hypophosphitium Composita.**

℞ Sodæ Hypophosphitis }
Calcii Hypophosphitis } ... ... āā. gr. 5.
Infusi Quassiæ ... ... fl. ℥i.
Misce.

Use.—This is the ordinary tonic prescribed at hospital for phthisis. It is varied by addition of strychnia or arsenic; and sometimes the compound syrup of the hypophosphites is substituted.

PILULÆ—PILLS.

103. **Pilula Expectorans.**

℞ Pilulæ Scillæ Compositæ ... ... gr. 4.
Pulveris Doveri ... ... gr. 2.
Pilulæ Rhei Compositæ ... ... gr. 3.

M. ft. pil. ij.—Two pills to be given night and morning, and, if necessary, one or two also at intervals in the day.

Use.—These pills, which are very similar to some well known as prescribed by the late Dr. Billing, are most valuable in cases of loss of singing voice from simple catarrhal causes.

104. **Pilula Hydrargyri Bi-cyanidi, T.H.P.**

Each pill contains $\frac{1}{10}$ grain of Bi-cyanide of Mercury, with sugar of milk and mucilage.

Dose.—One twice a day.

Use.—In tertiary syphilitic affections. Also reputed to be of value in arresting quinsy.

105. **Pilula Hydrargyri Iodidi Viridis.**

℞ Hydrargyri Iodidi Viridis ... ... gr. $\frac{1}{2}$.
Extracti Hæmatoxyli ... ... gr. 2.
Extracti Lactucæ ... ... gr. 3.
Misce. Fiat pilulam.

Use.—In secondary and early tertiary syphilitic affections.

106. **Pilula Hydrargyri Subchloridi Composita, B.P.**

Use.—In secondary syphilitic affections of the throat.

107. Pilula Hydrargyri c. Opio.

℞ Pilulæ Hydrargyri ... ... gr. 1.
Pulveris Opii ... ... gr. ¼.
Misce. Fiat pilulam.

108. Pilula Calcii Sulphidi.

These are made by Richardson and also by Kirby, and contain:
Calcii Sulphidi ... ... gr. ⅛ to gr. 3.

Use.—In strumous enlargement of glands, in chronic tonsillitis, furuncles of the ear, etc.

NOTE.—This drug is also prescribed at the hospital in powders, and as a mixture with tragacanth and cinnamon water.

109. Pilula Calcii Sulphidi c. Iodoformi.

These consist of pills of the same varying strength of the first drug as in the foregoing formula, combined with—
Iodoform ... ... gr. ¼ to gr. 1.

Use.—As the foregoing. They have proved serviceable in some cases of soft goitre.

110. Pilula pro Dyspepsiâ.

℞ Quiniæ
Acidi Carbolici } ... ... āā. gr. ½.
Extracti Rhei
Pepsinæ Porci (Bullock's) ... ... gr. 2½.
Misce. Fiat pilulam.

Dose.—One before each meal at which meat is taken.

Use.—Valuable in sluggish digestions with flatulence, and especially serviceable for vocalists, actors, and all speakers in whom the digestive function is frequently impeded by nervousness.

111. Perles Camphoræ Mono-bromidi (Tisy).

These perles (sold by Corbyn and Co.) contain 3 grains of the active ingredient in hermetically closed gelatine envelopes. They are absolutely tasteless, and not larger than a four-grain pill.

Dose.—One every 2 or 3 hours until pain is relieved. If the temperature becomes lowered, the intervals must be increased.

Use.—In neuralgic affections of the larynx.

112. Perles Ferri Iodidi (Tisy).

The Iodine and Iron are separated in these pills, so that combination only takes place in the stomach itself, and there is no fear of previous decomposition, as with other forms of this valuable remedy. Each perle contains the equivalent of one grain of Iodide of Iron.

Dose.—One three times a day.

113. Granulæ Zinci Phosphidi.

These small pills contain $\frac{1}{10}$ grain of Phosphide of Zinc, and in the author's experience are quite equal in effect to, and less likely to produce eructations than, the pure phosphorus in capsules.

Dose.—One three times a day.

VARIÆ—VARIOUS.

114. Linctus Expectorans.

℞ Oxymellis Scillæ ... ... fl. ʒiss.
Tincturæ Camphoræ Compositæ ... ... fl. ʒvj.
Spiritūs Ammoniæ Aromatici ... ... fl. ʒss.
Vini Ipecacuanhæ ... ... fl. ʒij.
Misce.—A teaspoonful for a dose.

115. Linctus Sedativus.

℞ Tincturæ Opii ... ... fl. ʒj.
Acidi Sulphurici diluti ... ... fl. ʒiss.
Theriacæ } ... ... āā. fl. ʒj.
Aquæ }
Misce.
Dose.—A teaspoonful.

116. Anti-catarrhal Smelling Salts.

℞ Acidi Carbolici ... ... gr. 30.
Ammoniæ Carbonatis ... ... ʒj.
Pulveris Carbonis Ligni ... ... ʒj.
Olei Lavendulæ ... ... ♏xx.
Tincturæ Benzoini Compositæ ... ... fl. ʒss.
Misce.

The above mixture was made as the result of analysis of a well-known patent remedy for colds in the head, and is very efficacious in certain catarrhal conditions of the naso-pharynx.

117. Pigmentum Acidi Lactici (Krause).

Aqueous dilutions containing 20, 40, and 60 per cent. of the acid are employed for *faucial* tuberculosis, and also for lupus. It is recommended to apply a 10 per cent. solution of cocaine to the affected part; then to scrape freely and by means of a brush, to apply *with firmness* the pigment in gradually increasing strengths each alternate day.

118. Pigmentum Menthol (Rosenberg).

This consists of a mixture of 20 parts of menthol with 80 of olive oil, liquid vaseline, or odourless paraffin oil. It is amongst the most recent topical applications recommended for *laryngeal* tuberculosis, and may be applied by either brush or spray. It is also useful for reducing hyperæmia of the turbinate bodies.

119. Pulvis Menthol Comp.

This consists of a mixture—to be used as a nasal snuff, or with insufflator—of menthol with powdered spermaceti (where moisture is required), or of sugar of milk (where rhinal flow is excessive), in the proportion of 1 in 30.

120. Gossypium Menthol (Bullock & Co.).

Wool impregnated with menthol to the extent of 5 per cent. is employed for nasal cases by introduction into the nostrils, and in the strength of 10 or 20 per cent. by apparatus for oro-nasal respiration in cases of pharyngeal and laryngeal inflammation, especially those of a tuberculous character.

121. Trochiscum Menthol (Christy).

Antiseptic, astringent, and analgæsic. Useful in most forms of pharyngitis, and especially in tonsillitis and insanitary forms of sore throat.

PLATES.

THE Illustrations are so arranged that they can be studied during perusal of the text, referring to them without the inconvenience of constantly turning the leaves.

For this purpose it is necessary only to unfold the Plate, and it will then lie beside the letter-press.

A short description of each figure is given on the page corresponding to the Illustration.

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XV.	The Lymphatic Vessels of the Base of the Tongue, Tonsils, Larynx, and Pharynx—Photo-lithograph (*after Sappey*)	122

PLATE I.

Varieties of the Normal Larynx as seen in the Mirror.

Fig. 1 represents the appearance, so far as form is concerned, of a typical larynx in the act of deep inspiration; and Fig. 2 in that of ordinary phonation. The other figures illustrate variations in conformation of different portions. (Pages 61 to 67.)

As stated in the text, no attempt has been made at coloration, either in this Plate or in Plate X., since the tint of mucous membrane in different individuals is as various in grade as is the complexion of the skin.

A.C.—Anterior Commissure of the Vocal Cords.
L.G.E.F.—Lateral Glosso-Epiglottic Fold.
S.G.E.F. (Fig. 7).—Superior Glosso-Epiglottic Fold.
T.E.F. (Fig. 2).—Thyro-Epiglottic Fold.
P.E.F.—Pharyngo-Epiglottic Fold.
A.E.F.—Ary-Epiglottic Fold.
S.S.E.—Superior Surface of Epiglottis.
I.S.E.—Inferior Surface of Epiglottis.
C.E.—Cushion of Epiglottis.
L.E.—Lip or Free Edge of Epiglottis.
V.B.—Ventricular Bands—formerly called False Vocal Cords.
V.M. (Figs. 1 and 6).—Ventricle of Morgagni.
F.I.—Fossa Innominata.
C.W.—Cartilage of Wrisberg.
C.S.—Capitulum of Santorini.
I.A.F.—Inter-Arytenoid Fold.
P.C.—Posterior Commissure of the Vocal Cords.
V.C.—Vocal Cords.
V.P. (Fig. 2).—Vocal Process.
C.C.—Cricoid Cartilage.
T.—Trachea.
R.B.—Right Bronchus.
L.B.—Left Bronchus.
H.F. (Fig. 2).—Hyoid Fossa.
C.H.—Cornu of Hyoid Bone.

PLATE I.

Fig. 1

Fig. 3.

Fig. 2

Fig. 4

Fig. 5

Fig. 6.

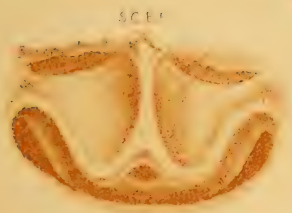

Fig. 7.

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Lennox Browne ad nat.r del.

PLATE II.

Diseases of the Fauces and Pharynx.

Fig. 12.—Acute inflammation of the fauces and pharynx. (Page 188.)

Fig. 13.—Subacute inflammation of fauces, occurring in a gentleman, æt. 42, of arthritic diathesis and prone to excess in stimulants and tobacco-smoking. (Page 189.)

Fig. 14.—Chronic relaxation of velum with congestion of the pillars of fauces. The thinning of the mucous membrane of the velum, without much relaxation of the uvula, is also here indicated. (Pages 190 and 232.)

Fig. 15.—Strumous thickening of fauces with similar disease in the naso-pharynx. The drawing represents the exact size of the arch of the soft palate in the patient, æt. 17, to whom allusion is made at page 623. The rhinoscopic image is shown in Fig. 41, Plate V.

Fig. 16.—Subacute inflammation of pharynx with pustular eruption of chicken-pox (page 189). This drawing was taken from a young lady, æt. 20, seen October 15, 1877, in consultation with Mr. Henry Bullock.

Fig. 17.—Secondary outgrowth from velum, the result of tertiary ulceration. That on the right of the centre line is the true uvula considerably relaxed. (Pages 206 and 208.)

Fig. 18.—Chronic pharyngitis with venous congestion and glandular hypertrophy—occurring in a professional vocalist (tenor), æt. 26. The varicose veins were intercepted at five points by galvano-caustic application (October 18, 1877). The granular condition at once subsided, and the patient regained his singing voice. (Page 190 *et seq.*)

Fig. 19.—A similar condition, of much longer standing, occurring in a lady's-maid, æt. 35. Cured by similar treatment, February, 1877. Was known to have remained well in the following November. (Page 190 *et seq.*)

Fig. 12

Fig. 13

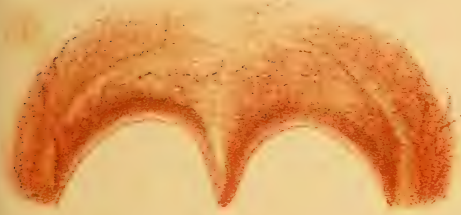

Fig. 14

Fig. 15

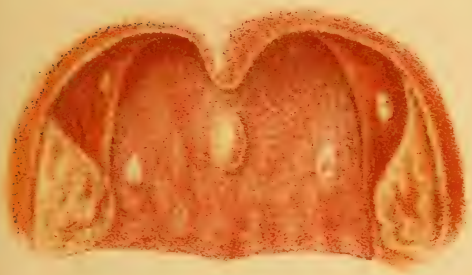

Fig. 16

Fig. 17

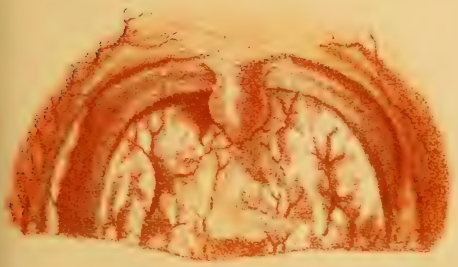

Fig. 18

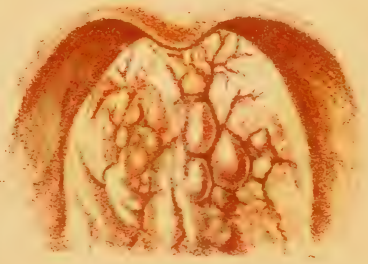

Fig. 19

Drawn from nature and on stone by Lemuel Brann

PLATE III.

Syphilitic Disease of the Pharynx.

Fig. 20.—Secondary congestion and mucous patches on velum and uvula —drawn from a female, æt. 23, married five years, and having a healthy child nine months old. Primary infection probably five or six months previously. (Page 200 *et seq.*)

Fig. 21.—Secondary congestive patches with two small symmetrical condylomata at edge of posterior pillars; drawn October 18, 1877, from a female patient, æt. 21. Squamous eruption on skin. Primary disease probably six or eight months previously. (Page 200 *et seq.*)

Fig. 22.—Secondary congestion with characteristic raised mucous patches on fauces and tonsils; drawn September 24, 1871, from a married female patient, æt. 28. (Page 200 *et seq.*)

Fig. 23.—A typical case of secondary congestion with strikingly symmetrical mucous patches; drawn February, 1874, from a male patient, W. W., æt. 23, who had been primarily infected six months previously. (Page 200 *et seq.*)

Fig. 24.—Tertiary ulceration of right side of pharynx and velum, and of posterior wall of pharynx; drawn from H. F., an engine-driver, æt. 27, who had been primarily infected three and a half years previously. (Page 204 *et seq.*) In this patient there was also paralysis of the abductor of the left vocal cord.

Fig. 25.—Active tertiary ulceration of posterior pharyngeal wall, with old cicatrices and cicatricial outgrowth; drawn from Catherine P., æt. 41, who had suffered from sore throat for more than seven years. (Page 208.)

Fig. 26.—Old perforating ulcers of velum and of right side of pharynx, with cicatricial outgrowth in the latter situation. The puckered condition of the velum around the central perforation well illustrates nature's attempt to close off the passage to the posterior nares. (Page 208.) The laryngeal condition of this patient, Edward F., æt. 53, is delineated in Fig. 56, Plate VIII.

Fig. 27.—Congenital tertiary ulceration; taken from a female patient, æt. 15, March, 1874, who had suffered also from double interstitial keratitis, for which iridectomy had been performed on one eye. (Page 208.)

Fig. 20.

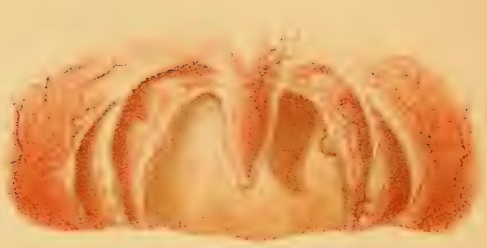

Fig. 2.

Fig. 22.

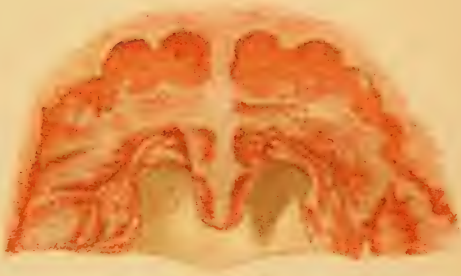

Fig. 23.

Fig. 24.

Fig. 25.

Fig. 26.

Fig. 27.

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PLATE IV.

Diseases of the Uvula and Tonsils.

Fig. 28.—Acute œdema of uvula. (Page 229.)

Fig. 29.—Chronic inflammation of uvula with relaxed mucous membrane, which is seen to be slightly bifurcated. (Pages 230 and 232.) Drawn from W. P., æt. 31, painter, July 11, 1877.

Fig. 30.—Warty growth attached by long membranous pedicle to uvula, and causing severe dyspnœa; removed December 4, 1876, with immediate relief. (Page 236.)

Fig. 31.—Acute inflammation (quinsy) of left tonsil on the fourth day. The uvula is seen characteristically lying on the swollen gland. (Page 241.)

Fig. 32.—Chronic scrofulous hypertrophy of tonsils, occurring in a lad, æt. 17, sent for operation by Dr. Dobell. The uvula is also relaxed and rather nodular. (Pages 230 and 250.)

Fig. 33.—Chronic inflammatory hypertrophy of tonsils, the result of repeated attacks (twelve) of quinsy; occurring in a male patient, æt. 31. (Page 250.)

Fig. 34.—Carcinoma of tongue invading left tonsil. (Case alluded to at page 259.)

Fig. 35.—Lympho-sarcoma of right tonsil. (Case detailed at page 260.)

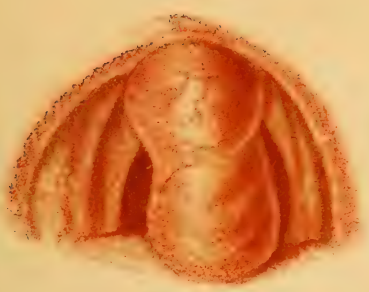

Fig. 28.

Fig. 29.

Fig. 30.

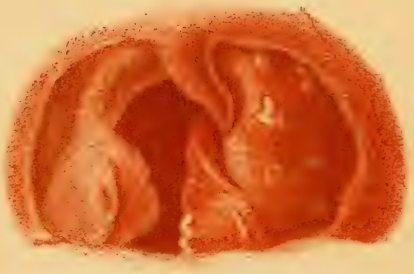

Fig. 31.

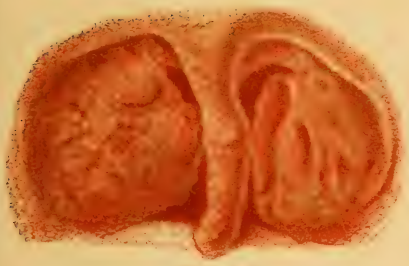

Fig. 32.

Fig. 33.

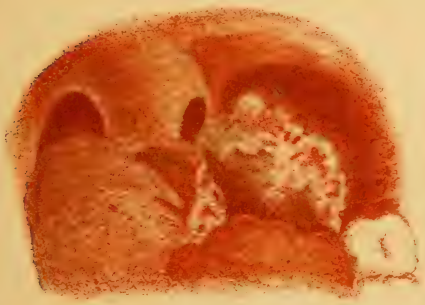

Fig. 34.

Fig. 35.

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PLATE V.

ACUTE TONSILLITIS—PHARYNGITIS SICCA—THE RHINOSCOPIC IMAGE, AND DISEASES OF THE POSTERIOR NARES—DIPHTHERIA.

Fig. 36.—Acute inflammation, with œdema of left tonsil and of uvula, occurring in a gentleman, æt. 22; drawn November 26, 1876. The parents of this patient were first cousins, and the darthous diathesis was strongly evidenced on both sides. The case was treated by aperients with colchicum, and suppuration was arrested. (Page 230.)

Fig. 37.—Pharyngitis sicca, with dry post-nasal catarrh and ozæna, occurring in a patient, æt. 27, whose sister also suffered from the same complaint. (Pages 196 and 623. It is very difficult to represent the dry glazed condition of the posterior pharyngeal wall, and the attempt to do so has been but partially successful. A delineation of this disease is repeated in Fig. 111, on Plate XIII.

Fig. 38.—The normal rhinoscopic image. (Pages 85 and 87.)

Fig. 39.—Tertiary ulceration of the posterior nares, in which case there was also entire destruction of the soft palate, and ulceration of the covering of the whole of the roof of the mouth. A Eustachian catheter introduced into the anterior nostril in the ordinary way is seen making its exit, and indicates how much normal tissue has been destroyed. (Page 204.)

Fig. 40.—Tertiary ulcerations on the posterior wall of the velum prior to perforation on the buccal surface. (Page 204.)

Fig. 41.—Rhinoscopic image of case, the faucial appearance of which is depicted in Fig. 15. In this view the granulations at the vault of the pharynx and the new growth on each side of the vomer are depicted. (Page 623.)

Fig. 42.—Diphtheria, occurring in a child, æt. 4 years. The right side of the throat was first attacked, and the false membrane in this situation is seen to be of a brownish hue, while that more recently exuded on the left tonsil and uvula is of characteristic greyish-white colour. At the lower portion of the left tonsil a bleeding ulcerated patch may be noticed, from which the membrane had just been removed. The laryngeal appearance, taken at the same time, is depicted in Fig. 55, Plate VI. (Pages 344 and 348.)

Fig. 43.—The rhinoscopic image of the same patient forty-eight hours later. (Page 347.) This view was taken very shortly after death. The post-mortem appearance is delineated on page 333 and in Fig. 117, Plate XIV.

Fig. 36

Fig. 37

Fig. 38

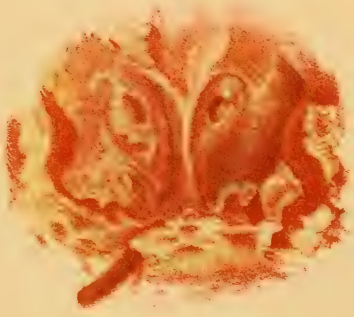

Fig. 39

Fig. 40

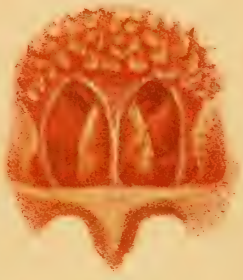

Fig. 41

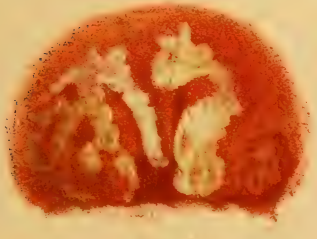

Fig. 42

Fig. 43.

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PLATE VI.

Non-specific Inflammations of the Larynx, etc.

Fig. 44.—Acute submucous inflammation of the larynx.—General œdema. (Page 301.) Such an amount of œdema is seldom seen in one case, unless it be the result of inflammation following typhus or other similar toxic cause. More generally the epiglottis or one ary-epiglottic fold is infiltrated, as in the following drawing.

Fig. 45.—Œdema of right side of epiglottis and right ary-epiglottic fold.

Fig. 46.—The same, twelve hours after scarification. (Page 306.)

Fig. 47.—Infra-glottic œdema. This condition is generally at first the result of acute inflammation; but it is also seen to last much longer than when occurring above the vocal cords. When it thus assumes a subacute or chronic form it often gives rise to respiratory symptoms of the gravest nature. (Page 302.)

Fig. 48.—Mucous inflammation of larynx, especially of both vocal cords. (Page 275.)

Fig. 49.—Mucous inflammation of right ventricular band and of epiglottis. (Page 275.)

Fig. 50.—Chronic inflammation of right vocal cord, the vocal process standing out as a white prominence. (Page 287.)

Fig. 51.—Mucous inflammation of the larynx, with pustules of chicken-pox, occurring in the patient whose pharyngeal condition under similar circumstances is depicted in Fig. 16, Plate II. (Page 273.)

Fig. 52.—Chronic laryngitis, with congestion of the vocal cords and arytenoid cartilages, and superficial ulceration of the cords at the vocal process. This drawing was made from the larynx of a clergyman engaged also in a school, æt. 30, who had been hoarse on and off for six years. Local treatment, with complete rest of the voice for eight months, effected a cure of the congestion and ulceration; but the voice, although rendered serviceable, never regained purity of tone. (Page 287.)

Fig. 53.—Glandular laryngitis, also occurring in a young clergyman of very delicate family history, but without any defined pulmonary disease. He passed two winters abroad with great benefit, and the larynx improved; but the catarrhal tendency remained, and was easily excited to recur. (Page 287.)

Fig. 54.—Traumatic subacute laryngitis, from a somewhat common cause. namely, lodgment of a foreign body—in this instance a pin—in the right hyoid fossa. (Page 304.)

Fig. 55.—Diphtheria in the larynx, taken from the same case as that which illustrates the appearance in the pharynx and posterior nares (Figs. 42 and 43, Plate V., and page 344.)

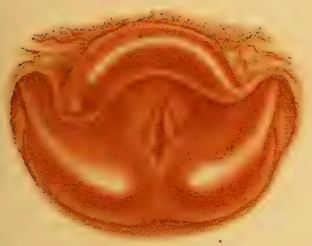

Fig. 44.

Fig. 45.

Fig. 46

Fig. 47

Fig. 48.

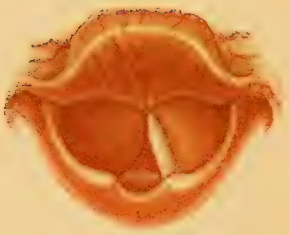

Fig. 49.

Fig. 50

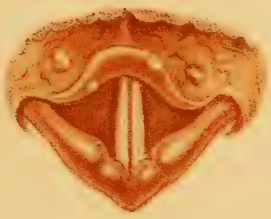

Fig. 51.

Fig. 52.

Fig. 53

Fig. 54

Fig. 55.

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PLATE VII.

Syphilitic Laryngitis.

(Chapter XVIII., pages 378 to 396.)

Fig. 56.—Secondary syphilis in larynx, with mucous patches on the epiglottis and in the inter-arytenoid space. The mottled appearance of the vocal cords may be observed in this and the following figure. (Page 378.)

Fig. 57.—Secondary syphilitic congestion of the vocal cords, with unevenness of outline hardly amounting to ulceration, and condylomata in the inter-arytenoid fold. (Page 380.)

Fig. 58.—Syphilitic congestion of larynx, especially of right side, with ulceration, somewhat symmetrical, of the ventricular bands, and of the left vocal cord. Here again is seen a more completely organized new growth in the posterior commissure. (Page 379.)

Fig. 59.—Acute inflammation and ulceration of the right ventricular band and right vocal cord, in a patient long the subject of syphilitic laryngitis, and subject to relapses on reception of catarrhal influences. A new growth is seen beneath the cords at the anterior commissure. (Pages 379 and 354.)

Fig. 60.—Ulceration of the left lateral glosso-epiglottic and the left pharyngo-epiglottic fold, which occurred in a male patient, æt. 44, first seen December 8, 1876, who had been married twenty years, and was the father of nine children. The symptoms pointed somewhat to malignant disease, in the appearance of which there is also some resemblance (see Fig. 90, Plate IX.); but under local treatment and iodide of potassium recovery was so rapid and complete as to leave no doubt as to its nature. (Page 382.)

Fig. 61.—Characteristic appearance of epiglottis which has been subject to specific ulceration (to be seen also in Figs. 65, 66, and 67), with paralysis of right vocal cord from deposit around the arytenoid cartilage. The drawing (made April 6, 1877) represents the larynx in the act of phonation, and the affected cord is seen to be in cadaveric position (Fig. 92, Plate IX.). The patient, æt. 53, had suffered from a hard sore eighteen years previously. His pharyngeal condition is seen in Fig. 26, Plate III. He had been hoarse for four months, but had no difficulty of breathing on exertion. (Page 386.)

Fig. 62.—Acute tertiary ulceration of the epiglottis, with swelling of the ventricular bands, a small portion of the right vocal cord only being visible.

Fig. 63.—A similar condition but less acute, with typical ulcerations over the arytenoid cartilages. (Page 382.) In both these drawings, also, the typical character of the thickening of the epiglottis and of the ulceration is marked (page 382), and comparison should be made with Figs. 44, 73, 74, 75, and 89, where this part is so affected from other causes.

Fig. 64.—Total destruction of the left half of the epiglottis, with paralysis of left vocal cord and outgrowths from the pharyngeal wall. (Page 382.)

Fig. 65.—Stenosis from deposit, with adhesion at the anterior portion of the vocal cords, and in a less degree at the posterior commissure. The patient from whom this drawing was made, had tracheotomy performed at a general hospital three years ago, but the tube was removed without a laryngoscopic examination. The operation had therefore to be repeated. (Page 386.)

Fig. 66.—Stenosis of the larynx in a patient, æt. 35, on whom tracheotomy was performed by the author in October, 1875. He has continued wearing the tube with opening in upper wall and with open valve, and pursues his vocation as a broker.

Fig. 67.—Atrophy of left vocal cord following extrusion (after ulceration) of the left arytenoid cartilage. Drawn from a patient, æt. 38, who had suffered from laryngeal syphilis on and off for ten years.

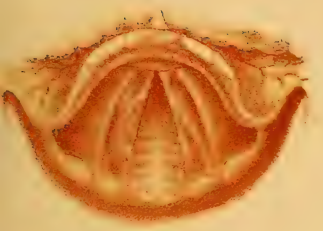
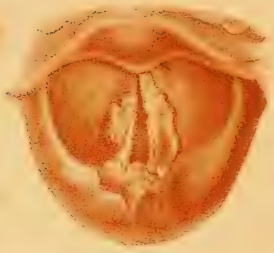


Fig. 56.

Fig. 57.



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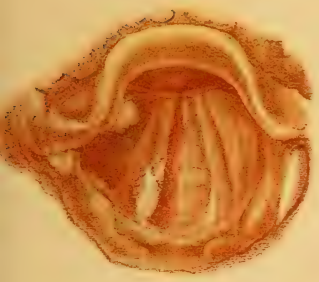
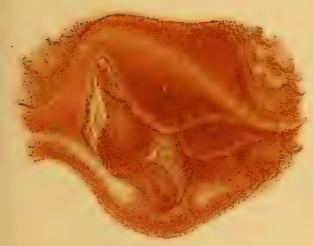


Fig. 59.

Fig. 60.

Fig. 61



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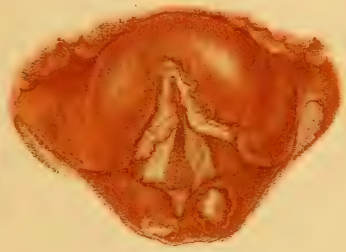

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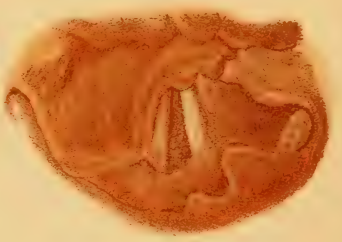

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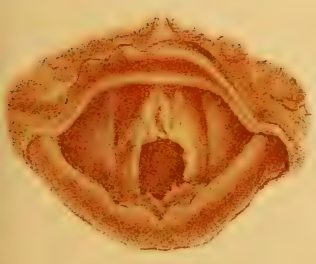

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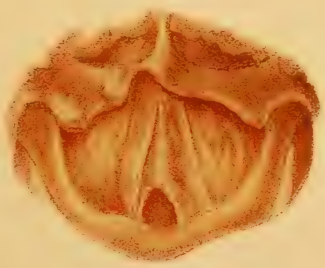

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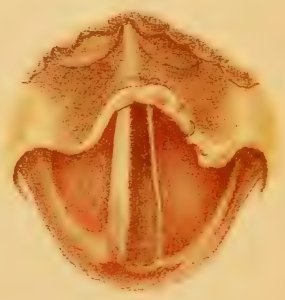

Fig. 67

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PLATE VIII.

Anæmia of the Larynx—Tubercular Laryngitis, etc.

(Chapter XII., page 269; XIX., page 397; and XV., page 309.)

Fig. 68.—Anæmia of the larynx, with feeble adductive power of vocal cords. (Page 269.)

Fig. 69.—Appearance of the right vocal cord twelve hours after a slight hæmorrhage from that spot. (Page 271.)

Fig. 70.—An early stage of laryngeal phthisis, showing grey coloration, thickening of mucous membrane over and between arytenoid cartilages, and ulceration comparatively superficial of vocal cords. (Page 401.)

Fig. 71.—Characteristic pyramidal swellings of arytenoid cartilages; commencing degeneration of glandules of epiglottis in laryngeal phthisis, in male patient, æt. 28. Consolidation at apices of both lungs. (Page 401.)

Fig. 72.—Similar thickening, especially on the right side, with prominence of racemose glands, and commencement of carious ulceration. At this date there was but slight physical evidence of lung disease.

Fig. 73.—Characteristic ulceration of larynx, especially of epiglottis (on left side of which there is also seen a small false mucous growth), occurring in a male patient, æt. 44, with moist cavities in both apices. (Page 402.)

Fig. 74.—Thickening of epiglottis and arytenoid cartilages in a male patient, the subject of laryngeal phthisis, æt. 36, who had suffered pain in swallowing for eight months; pain in the chest, cough, and hoarseness for four months. Disease at left apex. (Page 401.)

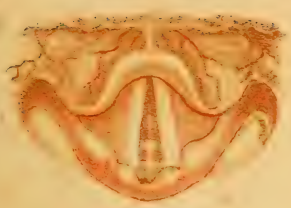
Fig. 75.—Advanced stage (three months later) of case shown in Fig. 72. Patient, a lithographer, æt. 37, had now well-marked evidence of a cavity at right apex. The right vocal cord is seen paralyzed; breathing was stridulous, and paroxysms of dyspnœal cough frequent. (Page 402.)

Fig. 76.—Appearance of larynx in a patient the subject of laryngeal syphilis, and under observation for over three years, in which phthisis developed in the left lung.

Fig. 77.—Primary perichondritis of the left plate of the cricoid cartilage leading to the formation of an encysted abscess, which rose as high as the summit of the arytenoid cartilage. The drawing was made from a lady, æt. 65, a patient of Dr. Mackenzie's, by the author, who had sole charge of her during the last five or six weeks of her life. The case, which is one of great interest, is fully reported by Dr. Mackenzie in the 'Transactions of the Pathological Society,' vol. xxi. (Page 315.)

Fig. 78.—Degeneration (believed to be due to gouty or calcareous deposit) of the epiglottis, with symptoms of enlargement of the right crico-arytenoid articulation. The case was that of a gentleman, æt. 62, of confirmed gouty habit. (Page 311.)

Fig. 79.—Perichondritis at the right crico-arytenoid articulation, with formation of infra-glottic abscess and paralysis of right vocal cord, occurring in a maiden lady, æt. 62, with evidence of gouty inflammations in other regions of the body. (Page 315.)



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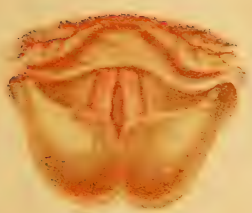

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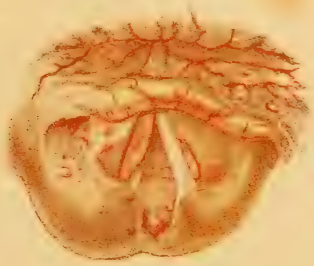

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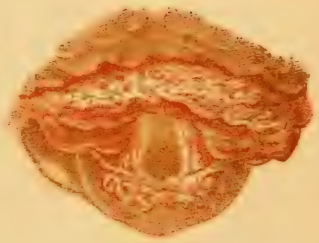

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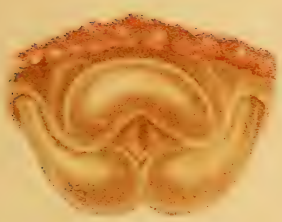

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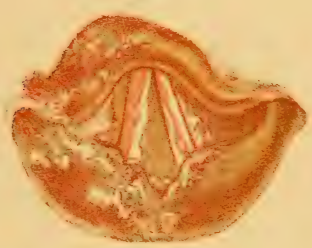


Fig. 75.

Fig. 76.

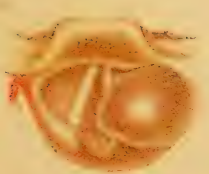


Fig. 77.

Fig. 78.

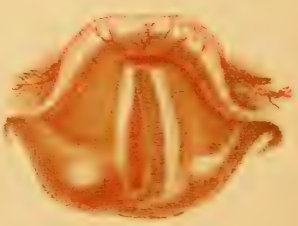


Fig. 79.

Drawn from nature and on stone by Lennox Browne

PLATE IX.

Benign and Malignant Growths of the Larynx.

(Chapters XXI. and XXII., pages 445 to 496.)

Fig. 80.—Fibro-cellular polypus situated beneath the vocal cords, with some general congestion of the larynx. The growth was removed by means of Gibb's snare, December 5, 1876, from E. A., æt. 22, married, without children, and engaged as an artificial flower-maker. After the operation she regained her voice, which had been quite lost for six months. There was a history of syphilis in this case.

Fig. 81.—Papilloma situated in the inter-arytenoid fold, above the level of the vocal cords, and not therefore interfering, except quite occasionally, with the voice. The drawing was taken from a patient, æt. 26, an actor, who had contracted syphilis four years previously, and who suffered from irritable cough, but pursued, and still pursues, his vocation.

Fig. 82.—Papilloma on the left vocal cord, interfering greatly with the voice, which varied from hoarseness to complete aphonia. This growth was removed by Jellenfy's instrument from a male patient, a hawker, æt. 32.

Fig. 83.—Mucous polypus attached by very fine pedicle to the right vocal cord of a bass singer, æt. 30, the patient of Dr. Llewelyn Thomas, who kindly sent him to the author for inspection. The peculiarity of this case was that the growth did not in the least interfere with the singing voice, and the patient was engaged twice daily in choir work. In ex-spiration the growth rested on the superior surface of the vocal cord (*a*), and in deep inspiration could be drawn quite beneath it and out of sight. With quick respiratory movements the polypus could be seen to flap to and fro (*b*). Dr. Thomas successfully dislodged it by friction with a laryngeal brush.

Fig. 84.—Symmetrical papillomata in the case of Mr. T. F., with syphilitic history. (Page 454.)

Fig. 85.—Papillomata growing from left ventricle and from under surface of right vocal cord, with mucous polypi on under surface of epiglottis and on left ventricular band. The majority of the growths were removed by tube-forceps, and a great improvement resulted, when the patient, a man, æt. 38, who had already visited other hospitals, ceased attendance.

Fig. 86.—Fibroma on left vocal cord causing hoarseness in a female patient, a hawker, æt. 38. Applications of astringents (principally iron) were of service in this case, but operative treatment was declined.

Fig. 87.—This drawing is a replica of one figured by the author in Mackenzie's work on growths in the larynx, and is there described as an adenoma. The growth, which was removed by Dr. Mackenzie, 'was exhibited by him at the Pathological Society ("Transactions," vol. xxi.), and referred for investigation to the Morbid Growth Committee. The Sub-Committee appointed to examine the specimen considered it a case of "adenoid carcinoma;" but the report was not confirmed by the full committee, and does not appear in the "Transactions."' It is, however, interesting to add that the patient, in whose case there was also distinct syphilitic history, died of malignant ulceration of the larynx, commencing at the seat of the tumour. The case is here inserted, as it well serves to illustrate the author's fifth proposition at page 455.

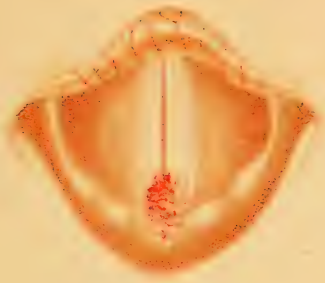
Fig. 88.—Pharyngo-laryngeal epithelioma commencing at the glosso-epiglottic and pharyngo-epiglottic fold, and thence invading the larynx. Necrosis of the cartilages has already commenced. Male patient, æt. 58. (Page 480.)

Fig. 89.—The same disease, distorting the epiglottis and pushing the larynx out of the median line. Male patient, æt. 63.

Fig. 90.—The same disease commencing in the hyoid fossa. The left vocal cord is seen to be paralyzed. Male patient, æt. 60.

Fig. 91.—Lympho-sarcoma of the larynx, occurring in a female patient, æt. 47. The disease had been diagnosed by another practitioner six months previously. This drawing was made in March, 1877, very shortly before death. The case is described at page 483, and the post-mortem appearance is depicted as Fig. 120 on Plate XIV.

Fig. 80.



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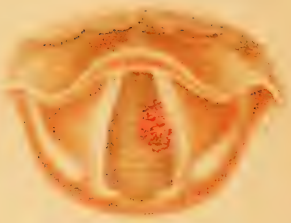


Fig. 82.

a Fig. 83. *b*

Fig. 84.

Fig. 85.

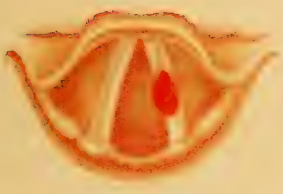
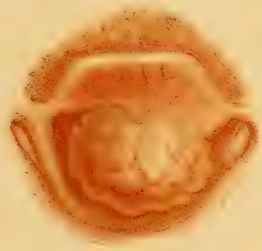


Fig. 86.



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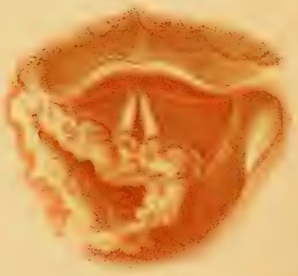

Fig. 88.

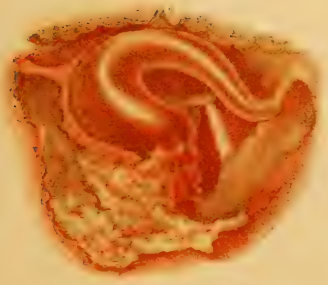

Fig. 89.

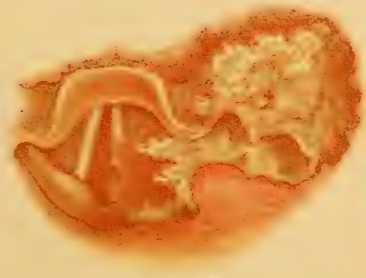

Fig. 90.

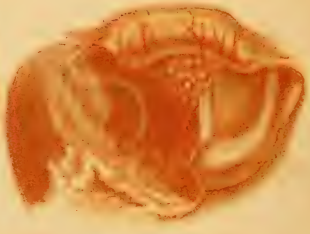

Fig. 91.

Drawn from nature and on stone by Lemuel Francis

PLATE X.

Neuroses of the Larynx.

Fig. 92. — Appearance of normal larynx after death, showing the 'cadaveric' position of the vocal cords; this is also their position during quiet respiration. (Page 506.)

Fig. 93.—Bilateral paralysis of adductors (crico-arytenoidei laterales and arytenoideus). Appearance in attempted phonation. (Page 506.)

Fig. 94.—Unilateral paralysis of adductors of left cord. Appearance in attempted phonation. (Page 508.)

Fig. 95.—Bilateral paralysis of abductors (crico-arytenoidei postici). Appearance with deep inspiratory effort. (Page 509.)

Fig. 96.—Unilateral paralysis of left abductor. Appearance in deep inspiration. The affected cord is seen to be in the cadaveric position. (Page 511.)

Fig. 97.—The same condition. Appearance in phonation; the right cord is seen to come beyond the median line, while the left is found in the cadaveric position. (Page 513.)

Fig. 98.—Bilateral paralysis of the sphincter of the glottis (thyro-arytenoidei). (Page 514.)

Fig. 99.—Bilateral paralysis of the arytenoideus. (Page 515.)

Fig. 100.—Bilateral paralysis of the thyro-arytenoidei, and of the arytenoideus. (Page 515.)

PLATE X

Fig [illegible]

Fig 94

Fig 95

Fig [illegible]

Fig [illegible]

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Fig 100

Lennox Browne ad nat^m del.

PLATE XI.

Tuberculosis of Larynx and Tongue.

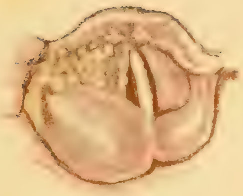
Fig. 101.—Laryngoscopic appearance, details of which are given at page 407.

Fig. 102.—Tuberculous ulcer of tongue during life, details of which are also given at page 407.

Fig. 103.—Tuberculous ulcer of tongue of the same case after death.

Figs. 104 and 105.—Post-mortem appearance of the larynx of the same patient, detailed description of which is given at page 407.

PLATE XI



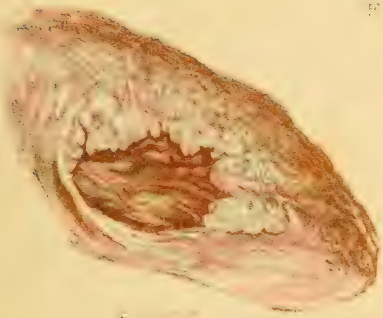


Fig.102.

Fig 104

Fig 105

PLATE XII.

Laryngeal Tuberculosis.

Figs. 106 and 107.—Laryngoscopic appearances at various stages of a case of tubercular laryngitis, the details of which are given at page 405.

Fig. 108.—Post-mortem appearance of the same case, the details of which are also given at page 405.

PLATE XII.

Fig. 1.

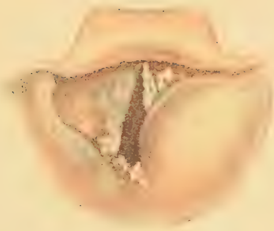


Fig. 2.

Fig. 3.

Lennox Browne ad nat. del.

PLATE XIII.

Fig. 109.—Tertiary syphilis of hard and soft palate. (Case related at page 204.)

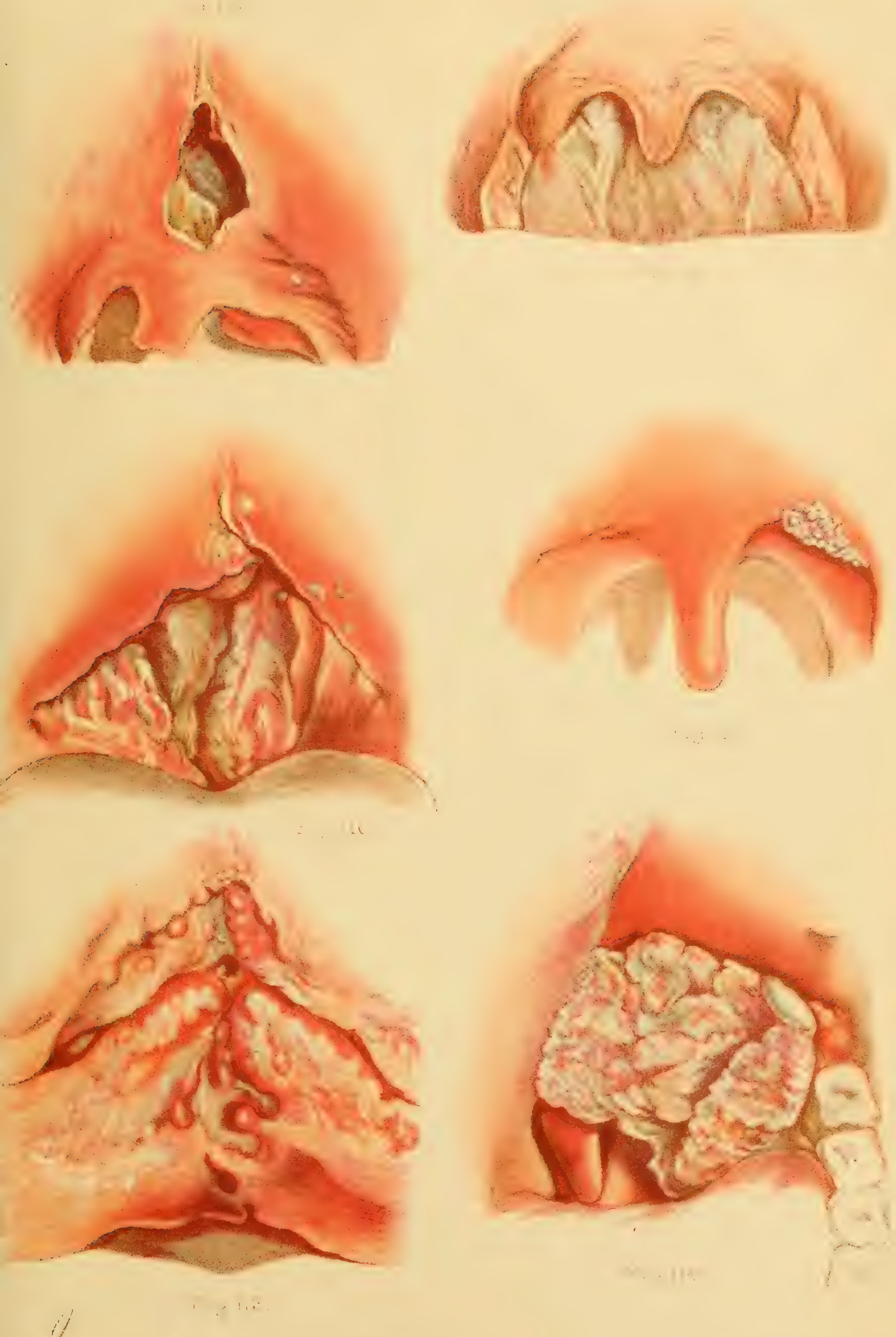
Fig. 110.—Multiple ulceration in tertiary syphilis of pharynx. (Page 204.)

Fig. 111.—Pharyngitis sicca. (Pages 196 and 623.) Compare with Fig 37, Plate V.

Fig. 112.—Epithelioma of soft palate. (Described at page 263.)

Fig. 113.—Syphilitic ulceration of the velum and pharynx in a scrofulous patient. (Case described at page 211. See also page 433.)

Fig. 114.—Primary epithelioma of tonsil. (Case described at page 263.)



Lennox Browne ad nat.m del.

PLATE XIV.

Fig. 115.—Traumatic membranous inflammation and hæmorrhagic extravasation of the uvula. Case was that of C. B., æt. 46, a carpenter, who applied at the hospital, February 3, 1879, stating that he had experienced pain in swallowing a piece of crust of bread at dinner the previous day, and found the rest of the meal painful. Was not in very good health at the time, and had had shiverings two or three days previously. The trouble subsided under salicylates, and the sucking of ice in small pieces. (Page 229.)

Fig. 116.—Inflammation and slough on uvula, seen in a patient, Kate G., aged 19, on the same day as the last case. Had experienced pain in eating some pie four days previously, and had had pain ever since. The case was treated by similar measures. (Page 229.)

Fig. 117.—Post-mortem appearance of diphtheria, showing the variation in the colour of membrane in various situations. That on the tonsils and palate being the earliest deposited, is seen to be the darker and firmer, while that low down in the trachea has the 'hoar-frost' appearance of the membrane when first exuded. (Page 344.)

Fig. 118.—Chorditis hæmorrhagica, seen in a young girl suffering from aphonia, on February 3, 1879, who had been a patient for a fortnight previously. (Page 271.)

Fig. 119.—Stenosis of the larynx, after lupus. (Case described at length, page 427.

Fig. 120.—Post-mortem appearance of lympho-sarcoma of the larynx, as described at page 483. See also Fig. 91, Plate IX.

Fig. 121.—Internal aspect of half of the larynx, removed during life for epithelioma. (Case described at page 493 *et seq.*)

Lennox Browne adnat.m del.

PLATE XV.

LYMPHATIC VESSELS OF THE BASE OF THE TONGUE, TONSILS, LARYNX, AND PHARYNX. (Pages 466 to 470.)

(*Reduced from Sappey's 'Atlas of the Lymphatic System.'*)

1″. Posterior portion of lymphatic network of dorsum of tongue. 2″. Circumvallate papillæ of the tongue. 3‴, 4″, 5″, 6″, 7″, 8″. Lymphatic vessels from the tongue, pillars of the fauces, etc., all converging towards the group of glands (13″) which are situated under the thyro-hyoid ligament, between the inferior cornu of the hyoid bone (20″) and the superior cornu of the thyroid cartilage (21″). 9″. Tonsils. 10⁗. Velum palati and uvula laid open from behind. 11″. Epiglottis. 12″. Lymphatic vessels of the pharyngeal aspect of the larynx. 14″. Lymphatics of the lower two-thirds of the pharynx. 15″. Lymphatics of the posterior pillar of the fauces. 16″. Lymphatics of the posterior and middle wall of the pharynx. 17″. Small and numerous lymphatics of the anterior or laryngeal wall of the pharynx. 18″. Lymphatics of the posterior and lower portion of the walls of the pharynx. These empty themselves into the glands situated to the right and left of the conical portion of the œsophagus. 19″. Lymphatics of the anterior and lower portion of the walls of the pharynx having the same destination. 22″. Posterior boundaries of the thyroid cartilage, as seen under the mucous membrane of the pharynx.

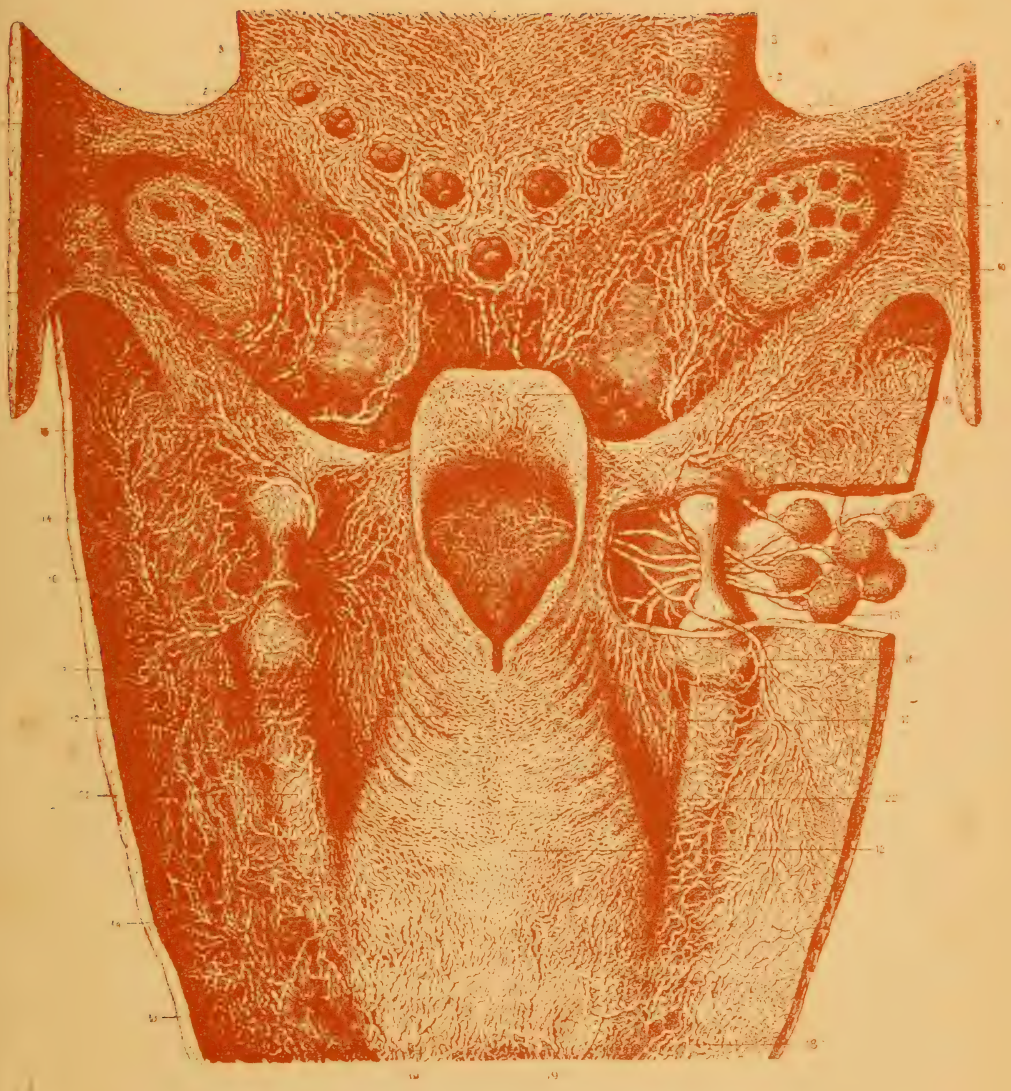


Fig. 122.

LYMPHATIC VESSELS

OF THE BASE OF THE TONGUE, TONSILS, LARYNX AND PHARYNX.

(Reduced from SAPPEY'S Atlas of the Lymphatic System).

THE THROAT AND NOSE

AND THEIR DISEASES,

BEING

A THIRD, REVISED, AND EXPANDED EDITION

OF

THE THROAT AND ITS DISEASES;

WITH

ILLUSTRATIONS BY THE AUTHOR.

GENERAL INDEX.

*** *For references to authors, see bibliographical lists at the end of each chapter.*

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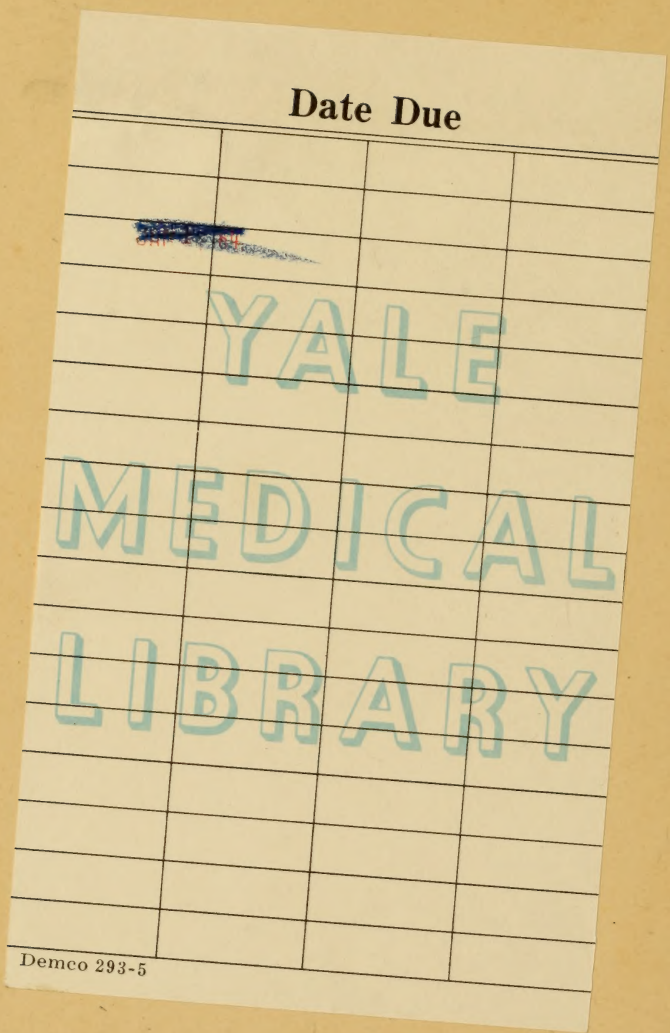
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